DOCUMENT RESUME

ED 108 382 EA 007 307

AUTHOR Ader, Jean
TITLE Building Implications of the Multi-Option School. Programme on Educational Building No. 2.
INSTITUTION Organisation for Economic Cooperation and Development, Paris (France).
PUB DATE 75
NOTE 108p.; A related document is EA 006 959
AVAILABLE FROM OECD Publications Center, Suite 1207, 1750 Pennsylvania Avenue, N.W., Washington, D.C. 20006 ($9.00)

EDRS PRICE MF-$0.76 PLUS POSTAGE. HC Not Available from EDRS.
DESCRIPTORS *Building Plans; *Case Studies; *Educational Alternatives; *Educational Facilities; Educational Programs; Facility Planning; *Facility Requirements; Models; Problem Solving; School Buildings; School Organization; Secondary Education
IDENTIFIERS Canada; Germany; Multioption School; Sweden; United Kingdom

ABSTRACT

This publication is the second in a series of reports on educational buildings. This report deals with the multioption school, a special type of secondary school designed to offer a broad choice of educational options and activities in response to changing educational and social needs. The report analyzes problems raised by the design and construction of multioption schools and discusses the process of transforming theoretical models into practical buildings and equipment. The analysis emphasizes the need to base design projects and the briefing process on a study of the school's functions. In addition, the author examines ways to reconcile educational needs and various constraints through interdisciplinary cooperation, research and development, and teacher participation. Contained in the report are five case studies, which include plans, diagrams, and photographs of new school projects in Canada, Germany, Sweden, and the United Kingdom. (Author/JG)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED105282

OECD

PROGRAMME ON EDUCATIONAL BUILDING

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL BY MICROFICHE ONLY HAS BEEN GRANTED BY
OECD
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER"

BUILDING IMPLICATIONS OF THE MULTI-OPTION SCHOOL

BY JEAN ADER

EA 007 307

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The Organisation for Economic Co-operation and Development (OECD) was set up under a Convention signed in Paris on 14th December, 1960, which provides that the OECD shall promote policies designed :

- *to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;*
- *to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development;*
- *to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.*

The Members of OECD are Australia, Austria, Belgium, Canada, Denmark, Finland, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

The Programme on Educational Building (PEB) was established by the Council of the Organisation for Economic Co-operation and Development as from January 1972. Its present mandate expires at the end of 1976.

The main objectives of the Programme are:

- to facilitate the exchange of information and experience on aspects of educational building judged to be important by participating Member countries;
- to promote co-operation between such Member countries regarding the technical bases for improving the quality, speed and cost effectiveness of school construction.

The Programme functions within the Directorate for Social Affairs, Manpower and Education of the Organisation in accordance with the decisions of the Council of the Organisation, under the authority of the Secretary-General. It is directed by a Steering Committee of senior government officials, and financed by participating governments.

© Organisation for Economic Co-operation and Development, 1975.
Queries concerning permissions or translation rights should be addressed to :

Director of Information, OECD
2, rue André-Pascal, 75775 PARIS CEDEX 16, France.

Author's Note

In my capacity as Rapporteur of the present study, carried out within the framework of the OECD Programme on Educational Building, I wish to express my sincere thanks to a large number of people without whose contributions this report could not have been written. To the members of the team which took part in the investigation: Mrs. Birgit Rodhe, Deputy Director for Education for the Municipality of Malmö, Sweden; Mr. Michael Keyte, an English architect practicing in Paris; and Mr. Karl Hermann Koch, architect and responsible for a course on educational planning and school building at the Dortmund Teachers Training College, Germany. To Mr. Guy Oddie, Professor of Architecture at Edinburgh University and principal adviser to the Programme on Educational Building and finally, to the OECD Secretariat itself for its invaluable help and encouragement throughout the preparation of this report.

This study also greatly benefitted from generous assistance by the national, regional and local authorities in the countries concerned and the design teams, school principals, teachers and other staff, parents and pupils of the schools visited — too numerous to be cited in name here. I extend to them my collective thanks.

While it has not been possible to reflect all the views and contributions from these various sources, the merits of this study were nonetheless greatly enhanced by them. Final responsibility for the text, particularly its shortcomings, remains of course with the Rapporteur.

Jean Ader
Inspecteur d'Académie

Table of contents

PREFACE ..... page 5

SUMMARY ..... page 6

● Part One

GENERAL PURPOSE OF THE STUDY

I. **HYPOTHESES: THREE GUIDING IDEAS** .... page 10
- A. To Identify the Common Problems
- B. To Set School Building in a Context of Change
- C. To Analyse the Approaches to the Briefing and Design of Projects

II. **DEFINITIONS: CHARACTERISTICS OF THE MULTI-OPTION SCHOOL** ..... page 11
- A. Its Situation in the Evolution of School Systems
- B. Social Objectives
- C. The Dual Character of the Multi-Option Schools
- D. A Wider Concept of Options

●● Part Two

THE FUNCTIONING OF THE MULTI-OPTION SCHOOL

I. **GENERAL ASPECTS OF THE USE OF MODELS** ..... page 16

II. **CHARACTERISTICS OF THE MODELS BROUGHT INTO PLAY BY THE DESIGN OF FACILITIES FOR MULTI-OPTION SCHOOLS** page 17

III. **HOW THESE MODELS ARE USED** ..... page 18

IV. **THE FUNCTIONING OF THE MULTI-OPTION SCHOOL AND ITS INTERNAL TENSIONS** ... page 21
- A. Common Core and Options in the Curriculum
- B. Common Education and Diversity of Attainment: Heterogeneous Groups and Differentiated Groups
- C. Remedial Education and the Integration of Minorities (Handicapped Children, Immigrants)
- D. Specialisation and Subject Integration
- E. Individualisation and Social Life
- F. Social Life and Social Organisation

V. **CONCLUSION** ..... page 28

●●● Part Three

THE PROBLEMS OF BRIEFING AND DESIGN

I. **WHAT IS THE POINT OF DEPARTURE FOR BRIEFING AND DESIGN ?** ..... page 30
- A. The Class Group as the Point of Departure for the Brief
- B. Subject Areas as the Point of Departure for the Brief
- C. Activities as the Point of Departure for the Brief

II. **A MULTI-DIMENSIONAL ANALYSIS OF BRIEFING AND DESIGN**	page 35	A. The Complexity of Activities B. The Analysis should lead to a Typology of Foreseeable Activities C. Determining Types of Facilities
III. **SOME PROBLEMS OF THE DETERMINATION OF SETS OF FACILITIES**	page 40	A. Compatibility and Incompatibility of Activities B. General-Purpose Facilities and Specialised Facilities C. Internal Composition of Sets of Facilities and Relations between Distinct Sets
IV. **THE QUANTIFICATION OF FACILITIES**	page 45	
V. **CONCLUSIONS**	page 47	

●●●● Part Four

INSTITUTIONAL ASPECTS

I. **IMPLEMENTATION OF DESIGN PROCESSES**	page 50	A. Diversity in Experiences and Common Problems B. The Collective Nature of the Tasks of Briefing and Design
II. **THE FRAMEWORK OF CONSTRAINTS**	page 51	A. The Positive Use of Cost Limits B. New Formulation of Norms
III. **INSTITUTIONAL ORGANISATION OF THE WORK**	page 53	A. A Research and Design Group as Exchange Vehicle in the Decision Hierarchy B. Problems in the Functioning of the Groups
IV. **CONCLUSION: THE MULTIPLICITY OF LEVELS OF RESPONSIBILITY**	page 54	

●●●●● Part Five

I. **HENRY FANSHAWE SCHOOL, Dronfield (England)**	page 58	
II. **GESAMTSCHULE [illegible]ONDENBERG (Germany)**	page 67	
III. **GRÖNDALSSKOLAN, Värnamo (Sweden)**	page 80	
IV. **SAMSKAP - A SWEDISH EXAMPLE OF CO-OPERATION IN SCHOOL BUILDING AT LOCAL LEVEL IN THE MALMÖ REGION**	page 86	
V. **SEF - A CANADIAN EXAMPLE OF AN INTEGRATED APPROACH TO SCHOOL BUILDING - DEFINITION OF REQUIREMENTS FOR THE INTERMEDIATE SCHOOL**	page 94	

Preface

The present report has been produced as part of Activity 2 of the Programme on Educational Building (PEB) which was set up by the OECD Council at the request of a number of Member countries. The purpose of the Programme is to facilitate the exchange of information and experience on aspects of educational building judged to be important by the participating countries and to promote international co-operation between them regarding the technical bases for improving the quality, speed and cost effectiveness of school construction.

The aim of the Activity was to study problems of facility provision for a new type of school, the multi-option school. In order to maximise educational opportunity many countries are adopting policies of generalised secondary education in which each school offers pupils an increasingly wide range of choice in the subjects and courses studied. The multiplicity of the options thus offered requires a corresponding increase in the diversity of the physical facilities and teaching expertise contained in the school and raises a number of new problems in the design of new buildings and in the adaptation and up-grading of existing stock.

The study thus dealt with one of the major themes underlying the activities undertaken under this Programme, namely that of the relationships between school building and educational innovation. This is why an initial version of the text that follows served as a background document to the Symposium on School Building and Educational Change which was held in October 1973 at Buxton, England, and the final report which has just been published.

The work on which the present text is based was conducted by a small pluridisciplinary team the members of which combined the skills of architects, educationists and administrators. Thanks to this diversity, in the course of the case studies undertaken on some selected schools in various Member countries and as a result of its discussions with design teams and with those responsible for school building at national level the team succeeded in delineating the main steps by which new types of facilities capable of meeting new teaching needs are defined. At the level of international exchanges, it seems that the clarification of design and construction processes yield more than the mere presentation of the solutions adopted.

Nonetheless, study of these processes has led to paying particular attention to certain specific design solutions and facilities. In point of fact one of the objectives of Activity 2 was to analyse newly built schools which through their innovative nature and inventiveness represent a fertile application of these design processes. From this point of view, the open areas and the modular furniture are important steps in the evolution of school building. But none of the examples quoted, nor any of the cases described should be considered as a model or an example bearing the recommendation or favour of the Programme on Educational Building. Indeed, the purpose of a report of this nature is not to recommend or prescribe but rather to get people thinking about new types of school buildings. In this way, the report hopes to contribute to the development of research in this field. It will only be meaningful if the ideas it outlines can be developed and lead to further work in greater depth in the countries themselves.

Summary

Definition of the Multi-Option School

To satisfy requirements linked to their economic and social development, most industrialised countries have created new educational formulae or types of school which display many common features. The general term « multi-option school » applies in the present report to those formulae which concern the re-organisation of secondary education and in particular the last stage of compulsory schooling.

In the countries under consideration, the multi-option school has two objectives:

— to ensure the highest possible level of general education without attempting to assess vocational aptitudes prematurely and irrevocably;
— to reduce inequalities of opportunity while developing autonomous conduct and encouraging the emergence and expression of individual ability.

The multi-option school is specific in its educational organisation in that it combines two fundamental features:

— it offers all pupils a common education;
— it offers each pupil the possibility of choosing from a wide range of activities.

This education of choice, essential to this type of school, leads to the organisation of options; this concept is to be understood in its broadest sense, since the choice may concern either fields of study (optional subjects, themes for an activity) or methods of work (roles and tasks, modes of expression and the material or technical aids for an activity).

Internal Tensions of the School and their Implications for Design

The design and construction of facilities (buildings and equipment) to meet the educational objectives of the multi-option school faces school building with unprecedented problems. This is why it is becoming so important to study approaches and methods of work whereby educational models can be translated into the reality of space and equipment. Indeed, it is no longer a matter of improving known types of school, but of calling their design into question in order to invent new educational tools and integrate them into sets of facilities of hitherto unattained complexity.

These processes are generally thought of as a linear process making it possible to deduce the nature of the facilities from the educational model. However, when the type of school is new, the continuity between the architectural proposals and the theoretical models so readily referred to is by no means a logical necessity and for instance, several different architectural solutions can be applied to the same set of educational principles. The reason is that the functioning of a multi-option school is a complex reality that cannot be conceived simply as the projection of a model. In actual practice, the principles underlying the multi-option school come into conflict and its functioning must be viewed as a set of educational tensions.

For instance, at the concrete level of school life, there is tension between the objective of common education and that of freedom of choice. The nature and layout of the accommodation, and in particular of specialised facilities, can govern these choices, broadening or narrowing them, and as it were predetermine the solution to be provided to the educational problem thus set.

Facilities with a high degree of flexibility are conducive to the individualisation of education; however, they may at the same time represent an obstacle to the stability of the groups and to their appropriation of space, thus handicapping the development of social relations. So here again, the nature of the facilities is a source of tension between two educational objectives.

Disadvantaged or handicapped pupils call for both special attention and more thorough integration into the school community and these two ambitions are not easy to reconcile. Is it possible to conceive facilities so that pupils in difficulty can be provided assistance without thereby cutting them off from their school mates ?

In order for the facilities effectively to meet educational objectives, models should be used embodying the tensions that are characteristic of the multi-option school. In this way, architectural proposals would not so much be answers to educational problems as projects for organising a framework within which the tensions inherent in educational reality can be made to co-exist, without masking them. What is expected of a school is not that it solve conflicts but that it serve the lucid mastery of their evolution.

The Problem of Briefing - a Key Concept: Activities

One of the essential stages in elaborating multi-option school projects, owing to their innovative nature, is briefing as defined in its broad sense.

School building briefs have long been based on the organisation of education in divisions in which the class group is considered as the only basic unit. This made for great monotony with respect to the size, the function and the potential use of the accommodation. This is why this type of organisation is unsuited to multi-option school projects, where diversification of activities and groups is very much the rule.

The briefing procedure based on departmentalisation takes as its point of departure the subjects taught and leads to defining the structure of the facilities by analogy with that of the curriculum. It has been used for several multi-option school projects, but has led to disappointing results; by dividing the school into specialised « quarters », it reinforces the compartmentation of knowledge and makes it impossible to create conditions conducive to the development of inter-disciplinarity and social relations.

The Concept of Activity

A more operational concept for briefing turns out to be that of activity, since each subject involves several types of activity, and some of these activities are common to several subjects. Projects prepared with this concept as point of departure delineate much better the difficulties of inter-disciplinarity or the differentiation of the work; they lead to a wider variety of solutions.

The concept of activity is not self-evident; to avoid cursory use and to make it an effective instrument for briefing, it must be subjected to a threefold analysis:

— an observable activity in a new school, for example, is only meaningful when related first to the activities expected by those who conceived the project and second to the activities actually rendered possible by the facilities provided;
— even when described in behavioural terms, activities are meaningless unless related to school situations;
— the field of activities must be broadened beyond activities related solely to school

work: namely those concerned with social life, recreation and leisure, and community use of facilities; logistic activities; and activities considered marginal but which must nonetheless be taken into account.

Simulation

After completing the analysis of activities, simulation of the main situations in the life of the school projected should make it possible to draw up a typology of foreseeable activities. Then, when proceeding with the detail briefing, models of educational procedure could then intervene, involving sequences of activities. The teaching units introduced in certain *Gesamtschulen* in Germany are examples of such procedures derived from a model used to design certain facilities.

Briefing should therefore allow not for activities, but for sets of foreseeable activities defined in the light of the specific choices of the project, and it is to these sets of activities that the facilities as a whole must correspond.

Difficulties

In determining these sets of activities and facilities, certain difficulties are encountered, namely:

— the first is in deciding which activities are compatible and can therefore be organised within the same set of facilities; this is one of the problems raised by open areas which have shown that the threshold of compatibility of activities, linked in turn to the threshold of tolerance, can vary considerably depending on circumstances and on the users;

— a second problem stems from the conflict between specialised and general-purpose facilities of the areas available, though it is by no means certain that it represents a real antinomy;

— the third and last problem relates to the internal composition of the sets of facilities and their inter-relationships; these in fact depend on interdependent decisions and should be studied simultaneously.

Quantification

Quantification of facilities is more a point of arrival than one of departure in briefing, though the need for this quantification is a constant constraint, the effect of which may be positive, in particular on decisions and choices.

The most operational unit for this quantification is the working place, the nature, area required and cost of which varies depending on the set and sub-sets concerned, and also with the possibilities of the designers to « negotiate » the constraints and even the norms.

Quantification of a brief not only consists in determining the capacity of the facilities, but also of distributing the places amongst the different types of facilities according to the cost per type of place, the priorities and the thresholds below which one cannot go.

The rigour which is implicit in the briefing and design process does not preclude a certain degree of indetermination in all multi-option school projects: the practice of an education of options leads to a random factor in forecasting requirements; the allocation of the different spaces within the school must be capable of variation and it must also be possible to change teaching practices as time goes by.

Research and Development

The work implied in the elaboration of multi-option school projects is a matter for collective research. Indeed, certain procedures, still widely used (an order placed with an architect, competitions), which presuppose a previously established brief as well as the separation of responsibilities, are poorly adapted to the study of such projects, maintaining as they do the intervention of the designers within a pre-defined framework which makes it impossible to arrive at school buildings satisfying radically new needs.

Between the policy-makers who determine the general objectives of the educational system and, for instance, decide to introduce the multi-option school, and the agencies responsible for initiating and supervising the building projects themselves, many countries lack a mechanism responsible for translating the educational objectives into operational models so that the necessary facilities can be determined. This gap cannot be bridged by mere regulations. To promote the building of schools satisfying these new objectives, an intermediate body for research and development is needed.

The first problem is to decide whether the action of this body should be based primarily on imperical observation and testing of new solutions, or whether it should concentrate more on fundamental research. Whatever the case, such a body requires continuity and a fairly broad field of action. Its work represents a continuous effort: drawing up of projects on the basis of analyses of actual situations, evaluation of projects, feedback of lessons learnt into new projects and wide distribution of the results of this work.

Thanks to this distribution, the research and development body can help to set up new structures of dialogue and foster the creation of design groups. These groups enable the barriers to be broken down between those who prepare the educational models and those whose task it is to interpret them, as well as between the latter and the users. The groups are often composite (educationists, architects, administrators, teachers, parents and pupils) and therefore experience problems of communication and language. The most fruitful level of intervention for their work is regional, even where the action takes place at local level and flows from guidelines imparted at national level.

In their attempt to innovate they are often confronted with constraints that cannot be eluded, but towards which they should be able to develop new attitudes. This concerns particularly norms and cost limits. These are not purely negative and can in fact stimulate the work by imposing choices; they also make for a certain fairness in the distribution of resources. However, their relative weight differs according to the way in which they are administered or regulated. In order to draw up projects for multi-option schools, the system of ceiling of expenditure most commonly adopted is that which uses the « cost place » as unit of account; this system leaves the design groups free to decide how to deploy the resources allocated to the project as a whole.

The problem of whether innovation in school building involves additional costs remains still very much in dispute. Experience of various countries differs widely and the conditions of innovation likewise differ. Compliance with cost limits makes innovation more credible, though it is by no means certain that additional costs are invariably unjustified. The levels at which cost limits are set is always the outcome of a political equilibrium between the pressure of needs and the availability of resources.

Part one:

GENERAL PURPOSE OF THE STUDY

I. Hypotheses: three guiding ideas

A. To Identify the Common Problems

1. In a number of countries the main preoccupations in the field of school building have evolved along comparable lines. For a long time, the needs arising out of reconstruction, urban growth, population pressures and migration, and the spread of schooling to a wider age range and greater numbers meant that the emphasis was essentially a quantitative one. More recently — within little more than the last ten years for some countries and much less than that for others — the emphasis has shifted to problems of quality. Some countries have been encouraged by the magnitude of their programmes to concern themselves with improving the effectiveness of the solutions proposed; in other countries, the obsession with numbers, having become less pressing, has given way to a greater reflection on the nature of the facilities to be provided. Thus, both educationists and those responsible for school building have become conscious of a fact which had long been neglected; there is a close, and sometimes decisive, relationship in school buildings between the layout of the accommodation and the type of education provided in it. The result is that a school building policy must nowadays pay greater attention than in the past to the question of what kind of facilities should be provided in order to develop the education which a society chooses for itself.

2. In the various situations in which this question is being tackled in concrete form, it is all the harder to arrive at satisfactory solutions, the more innovatory the type of education provided and the more elaborate its objectives. This is very evident wherever the types of school that are currently known as comprehensive or multi-option are developed. While they differ according to country and according to the date at which they first emerged, all these schools have a common approach to education: to give all the young access to a common culture, and at the same time, to differentiate the activities of the school in the light of their aptitudes and interests. The design and construction of suitable buildings for this new type of school have greatly stimulated — often with success — the creative imagination; but at the same time have posed a number of problems without always solving them, and have revealed numerous obstacles which are difficult to overcome. In a good many countries, moreover, the development of this type of school and the provision of the corresponding facilities are still embryonic and sometimes confined to promising but scanty experiments. It is for this reason that there is a strong international demand for information and exchange of experience on the design and provision of suitable facilities for the multi-option school.

3. Clearly, it cannot be the purpose of the present report to define the characteristics of the facilities (i.e. of the buildings and their equipment) which would constitute the best instrument for the multi-option school. Nor is it intended to make a catalogue of possible answers to the question already referred to namely, what kind of facilities to provide ? Experience has clearly proved that the solutions worked out in certain countries or certain regions cannot be directly transposed to others. It has also shown that when such a transposition has been attempted, it has not done away with the need for trial and error and for studies; finally, it has shown us that those responsible for school building hardly want to be told what solutions or what models to adopt or substitute for their own, but that they want to be helped in working out or improving their own solutions and their own models.

4. This report is therefore based on the hypothesis which seemed the most promising for the development of international exchanges in this field, namely that there are certain problems which are common to all those who, in various countries, design and provide the facilities needed by the new type of school. But these common problems are not always easy to identify. Far from it, they are often masked by circumstantial problems which demand urgent action, or by the constraints of finance or regulations specific to each country; sometimes a solution which is no longer challenged may itself be an obstacle to tackling fundamental problems. One of the first tasks will therefore be to identify the common problems brought to light by the various experiences encountered.

B. To Set School Building in a Context of Change

5. If the role and conditions of education are to change radically with time, the facilities provided for it must be adaptable to that change. No one formula for education (or given type of school such as the multi-option school) can be regarded as definitive. At the most, it can be said that it provides the most satisfactory answer to the educational needs of today's society. It must therefore be considered and studied in a context of change. In this sense, the multi-option school is a moment, a phase in the process of innovation, and can only be understood by analysing the changes it brings about.

6. The buildings designed and constructed for this type of school must be looked at from two viewpoints. On the one hand, they are the fruit of a major effort of innovation; to imagine new spaces and to create new facilities means

a break with old structures; but it also means challenging norms and customs which have adapted to these structures or been generated by them, and questioning constraints. On the other hand, these new facilities must adapt to future change and must favour innovation: in this sense the multi-option school must not, by becoming frozen into a formula, counteract and sterilise the movement which gave it birth.

7. Thus, the second hypothesis, or guiding idea, of the present report is linked to the fact that the present time must be regarded as a period of transition in most countries; the multi-option school is still far from general; where it is most highly developed, it is only by successive approximations that it has sought to define the facilities it needs. In this hypothesis, the problems raised by built or planned facilities appropriate to the multi-option school have the common characteristic of being problems of change. In other words, these problems raise or are related to three types of question.

a) Every solution, every answer to a problem of provision of facilities, is a challenge to an earlier solution or to an earlier order of things; it therefore refers back to the question of how such a challenge is, or has been, possible, since new solutions encounter resistance of all kinds.

b) Next, since a great many factors intervene in the running of a school, every new experience involves risks of distortion, since it is difficult to modify all these factors simultaneously. Thus, for example, the changes in the buildings and those which can be observed in the behaviour of their users occur at a very different pace, with the result that the planned use and the actual use of facilities do not coincide. One is therefore always brought back to the question of how to avoid, minimise or overcome the distortions when changes are introduced in the design and layout of school buildings.

c) Finally, beyond the standard question of « how to provide facilities suitable to the educational objectives of the multi-option school » we find another more complex question: how to ensure that these facilities allow multiple answers to the needs of modern education and that they encourage the invention of new activities and behaviour not strictly foreseeable at the time of their design ?

C. To Analyse the Approaches to the Briefing and Design of Projects

8. Solving the problems of school buildings, or as stated above, the provision of facilities, means establishing a set of relations between school life as it seems desirable and possible today and the organisation of its material setting. The multi-option school can be taken to represent a concept of school life the characteristics of which will be considered more fully below. It is this concept which, in principle, governs the organisation, layout and equipment of the spaces needed. How can this matching be arrived at ?

9. Since the multi-option school represents a break with the structure of the predominant school system, the facilities it needs cannot be defined by simple improvements or revisions of the current types of school buildings with a view to adapting them to new needs. On the contrary, where there have been significant achievements in building for this type of school, we find that there has been considerable preliminary work in defining on new bases the function and the structure of these facilities; from our point of view, this preliminary work is just as important as the results to which it leads. That is the third hypothesis or guiding idea of the present report. In this hypothesis, there are several reasons for the importance of this work. First of all, it brings to light the major problems raised by the design and provision of suitable facilities for the multi-option school; it is therefore a particularly useful field for the study of the common problems referred to above. Secondly, the school building projects of the type with which we are concerned are usually of some complexity, and this complexity is increased by their novelty. Therefore they cannot generally be assigned to a single specialist but call for team work among a number of different specialists with differing responsibilities. This confrontation of different points of view and the exchanges which it implies quite obviously afford favourable conditions for elucidating the problems we have to identify.

10. Finally, the value of the approaches which we propose to explore stems from their non-linear character. It is too common an illusion that one can pass from educational concepts to the definition of the projects which give them life by a simple process of deduction. Many of the documents presenting the development and construction of multi-option schools seem to suggest an unbroken continuity between an educational concept or model on the one hand and a building project on the other. But these documents are very often drafted after the event, when one can assume the problems have been solved and their purpose is to justify the solutions adopted rather than to analyse the difficulties encountered in arriving at them. Now, things are not as simple as that; it is easily learned from experience that the same model of functioning developed for multi-option schools of the same region results in different buildings with distinct architectural features. More fundamentally, it will be noted that educational models can never be the subject of a simple description in which their elements are juxtaposed in linear or static order. On the contrary, there are tensions, not to say conflicts, between these different elements, which one must not try to mask but which must be dealt with as such. For example, the multi-option school aims at giving all its pupils access to a common culture and at the same time developing their possibilities of choice; it must therefore offer them both a common core of knowledge and the widest possible range of options. But, in the actual organisation of a school, these two aims seem if not contradictory at least difficult to reconcile. Similarly, this type of school tends to develop the individualisation of education, which at the practical level of school life is bound to conflict with the development of social life, this being another of its objectives.

11. These tensions can certainly not be resolved by compromise or middle-of-the-road solutions. The responses invented by experience certainly do not eliminate them; these responses are therefore always provisional and shifting. The architectural implications of these educational tensions take specific forms, but without exactly reflecting the tensions; this simply means that there is no one-for-one correspondence between the educational tensions and the tensions created at the level of the facilities provided for the multi-option school — for example between general purpose facilities and their appropriateness to specific activities. It is the relations between these two different kinds of tension which afford the richest aspects of the problems of what we have called the provision of suitable facilities for the multi-option school.

II. Definitions: characteristics of the multi-option school

A. Its Situation in the Evolution of School Systems

12. The multi-option school must be regarded neither as an educational system in itself nor as a strictly defined type of school. Nor is it an ideal concept which is to be used in the evaluation of new schools. If the use of this general

term is justified, it is because it refers to the converging transformations which can be noted in the recent evolution of the educational systems of the industrialised countries. In these various countries such transformations, whose magnitude and style differ widely from one country to another, are the response to common concerns, and the designation multi-option school is one of the key-terms of a common language which makes it possible to relate these transformations to one another and to detect a certain coherence between them.

13. In the industrialised countries generalised primary education is already long established, whereas generalised secondary education, linked with the prolongation of compulsory schooling, is much more recent. Contrary to what happened in primary education, this extension was achieved by the successive addition of new types of school to the old traditional types of secondary schools: Modern Schools and Grammar Schools in Great Britain, *Hauptschulen* and *Realschulen* alongside the *Gymnasium* in Germany, complementary courses and modern colleges added to the *Lycées* in France, etc. In this way vertical streams relatively separated from one another resulted in the distribution of children leaving primary school into parallel routes with different contents. This distribution, the methods of which have evolved, and which vary in different countries, results in a selection which is premature and, in fact if not in law, final and irreversible; each stream represents an orientation from childhood towards a predetermined type of studies and type of career.

14. It is this educational system to which the multi-option school offers an alternative. The school with options has a long tradition for example at secondary level, High School, in the United States or in Europe at higher secondary level, the Swedish *Gymnasium* or the Sixth Form in English schools. But the multi-option school formulas designed for lower secondary or intermediate education (generally age 11 to age 14 or 15) are, on the contrary, much more recent. A few examples can be cited: the higher level of the Swedish Basic School (7th, 8th and 9th years), the English Comprehensive School or the German *Gesamtschule*, or the small number of *Collèges* with ability setting to be found in France. In Sweden this formula has been generalised throughout the country by central government decision since 1962, thus changing the educational system; in France, on the other hand, these schools are still only experimental and few in number; between these two extremes, the status of the multi-option school varies widely between regions and between countries.

B. Social Objectives

15. In spite of the great diversity of situations and the various types of multi-option schools, their appearance and development respond to needs which are largely comparable everywhere. The underlying reasons for the development of this innovation can be grouped in three main categories:

a) **Socio-economic needs:** The evolution of modern societies demands from more and more young people a constantly higher level of general education; this is one aspect of the full utilisation of human resources. The pace of technological development also calls for a degree of occupational mobility which makes it impossible to predict the education required by rapidly evolving skills. To meet the needs of a flexible economy, the new forms of education therefore seek to postpone as late as possible the age at which selection becomes irreversible and to eliminate the planned restrictions of an elitist education.

b) **Needs arising from social demand:** Today social justice no longer infers equality of access to education but equality of opportunity within the educational system for all young people, whatever their background. To achieve this new form of democratisation, the school is expected:
   - to reduce, through its organisation, the incidence of discrimination between children from different social groups;
   - to enable young people from different social backgrounds to share a common experience;
   - not to treat all children alike, since that enhances the cultural advantage of those who come from privileged circles, but, on the contrary, to offer each child the methods, pace and forms of education which suit it;
   - to guard against failure by guidance in providing teaching for the support and compensation of the less favoured children;
   - to develop free and responsible conduct, especially by allowing children gradually to take charge of their own education and therefore to choose their fields of study, the organisation of their work and the means of doing it, and, more generally, to combine individual development with genuine social education.

c) **Needs of a psychological nature:** The school is expected to encourage the greatest possible fulfilment of each individual. Differences of aptitude should therefore not be used to justify premature specialisation, but should rather be taken into account in differentiating the process of learning. This differentiation is further justified by the fact that there is no such thing as a general aptitude by which children can be classified into different graded streams of study; the learning processes must therefore be differentiated within a common education. Finally, the importance of motivation in studies leads to the organisation of diversified activities which disclose aptitudes rather than presupposing them, which are based on the expression of interests and tastes and which develop the participation of pupils in their own education. Effective education should not be something which is passively submitted to, but should involve the freedom and responsibility of the pupil. It thus involves an education of choice.

C. The Dual Character of the Multi-Option Schools

16. The term « multi-option school » will be used to designate all forms of secondary or intermediate education which combine both the following characteristics:

a) They group together in similar schools all young people in the relevant age groups (generally 11-12 to 14-15). They offer them all the same curriculum without specialisations or specific orientations and they emphasise the development of social relations between these pupils.

b) Their educational organisation is designed to allow each pupil a certain freedom of choice both in the content of education (subjects and areas of study) and in his working methods and the means employed.

17. It is important to stress that it is the combination of these two characteristics which gives these formulae their character of innovation. As already mentioned, non-comprehensive option schools have been known for a long time and do not meet the needs described above. Thus, for example, the system of options typical of the American or Canadian High Schools does not satisfy the above definition. This system operates only in favour of a pre-selected population within an education reserved for a minority; the problems it deals with are not comparable to those of a comprehensive multi-option school which seeks to develop a form of education common to all children. Furthermore, the framework within which this system operates evaluates the different choices in the light of the openings afforded by the different combinations of options chosen; some combinations, for example, qualify for university entrance; others do

not. The result is that, in spite of its great flexibility, this system ultimately reinforces the selective character of this education. In the absence of a comprehensive education common to all, a system of options may become self-contradictory.

18. Conversely, it can be said that a system of comprehensive education implies the provision of options and possibilities of free choice. The corollary of providing common education for all children is to provide a diversity of ways and means for its assimilation in view of the diversity of aptitudes and interests. This differentiation of the common education includes developing the possibility of the individual choosing his own path of learning. In the words of the Swedish *Läroplan* for the Basic School *(Grundskola)*, « The principle of free choice is a cornerstone of the comprehensive school » (1).

TABLE 1:
Periods Allocated per Week per Subject in the Swedish Basic School (terminal level)
(1 unit = 1 period of 40 minutes)

	Subjects	Number of periods					
		7th year		8th year		9th year	
		Pupils	Teachers	Pupils	Teachers	Pupils	Teachers
I	**Compulsory subjects**						
	Swedish	3	4	3	4	4	5
	Typing	—	—	—	—	—	1
	Mathematics	4	4	4	4	4	4
	English	3	3	3	3	3	3
	Music	2	2	—	—	1	1
	Drawing	2	2	2	2	1	1
	Handicrafts	2	2	2	2	1	1
	Domestic Science	—	—	3	3	2	2
	Physical instruction	3	3	3	3	3	3
II	**Orientation subjects**						
	Religion Civics Geography History Natural Sciences Chemistry Physics	10	13	10	13	10	13
III	**Optional subjects** (French, German, Economics, Arts and Technology)	4	4	3	3	4	4
IV	**Freely chosen work**	2	—	2	—	2	—
	TOTAL	35	—	35	—	35	—

Source **Curriculum for the Comprehensive School, Lgr 69, General Section,** National Swedish Board of Education, Stockholm, 1971, pages 6, 118.

Notes — The system of options intervenes at three levels (II, III, IV); at level II "Orientation subjects", the globalisation of the periods allocated makes it possible to orientate the pupils within the framework of pluridisciplinary activities, towards a variety of activities appropriate to their interests and abilities.

— The difference between the number of periods for the teachers and for the pupils results in "resource" or spare hours, the purpose of which is to permit diversification of teaching procedures (doubling of the teaching staff for a group, team teaching, work in small groups, etc.).

— In the 9th year, each pupil spends a fortnight as a trainee in a real life working environment.

D. A Wider Concept of Options

19. The word « option » in the term « multi-option school » must be interpreted very widely. Among its possible meanings the main stress will be laid on the following:

a) **Options as a choice of subjects offered to the pupil.** This is the traditional meaning of the word. The range of options is specified in the curriculum, together with the number of possible choices and the time spent on the option chosen. For example, in the Swedish *Grundskola*, during his last three years the pupil must choose one of four optional subjects — a foreign language, technology, economics or art — on which he will spend three or four hours a week. What are sometimes called « alternative courses », where there is a choice between a normal level, an advanced level and a « support » level, fall into this category of options. The pupils' aptitudes and their consciousness of them seem to influence their choice of this type of option more than their interests and tastes.

b) **Options as a choice of specific areas within a general subject.** In subjects such as foreign languages, often compulsory, a choice is generally offered between a number of languages. This is a familiar arrangement with nothing novel about it. The multi-option school often affords interesting extensions and improvements. This is found, for example, in the organisation of subjects such as arts, home economics or domestic science. In arts for example, the students will be allowed, within the alloted time, to split up into different « ateliers », such as drawing, painting, engraving, modelling and sculpture, ceramics or silk-screen printing. Provided these are interconnected, as they generally are, they never lead to narrow specialisation. The pupils' choice mainly depends on their special interests and skills.

c) **Options as the choice of an activity the nature and content of which are negotiated (2) between teachers and pupils.** For example, in a number of colleges in Touraine (France) « ateliers » are organised which offer the pupils a very wide range of fields (from drawing to applied mathematics, or from scientific experiments to pottery). The pupils split up according to their own tastes and depending on the places available. The nature of the activities is determined both by the interests and tastes of the pupils and by proposals made by the teacher in the light of their own skills (which, moreover, often go beyond their academic subjects) and of the facilities available in the school. The time spent on these optional activities is defined by the curriculum and organisation of the school. It obviously varies widely. In the Touraine colleges it amounts to about nine hours a week. In the Swedish schools (7th, 8th and 9th years) two

1) Curriculum for the Comprehensive Schools, Lgr 69, General Section, Skoloverstyrelsen, Stockholm, 1971, page 6.

2) In other words, the pupils' activities are no longer determined by the teachers alone (or by the curriculum they have to follow but by the teachers and pupils together).

TABLE 2:
Framework for the Organisation of Activities in "ateliers"
Collège d'Enseignement général, Sainte-Maure-de-Touraine, France

Number of groups by field for each working day of the week

	Monday		Tuesday		Wednesday		Friday
• Archeology	1	1	—	—	—	—	—
• Workshop practice	1	1	—	—	1	1	—
Sewing and needlework	1	1	1	1	1	2	2
Cooking	1	1	1	1	—	—	—
Drawing	1	1	—	—	3	1	1
• Documentation	1	1	1	1	1	1	—
French	1	1	2	—	2	2	2
History/Geography	—	—	—	1	2	1	2
• Printing	—	1	—	—	—	2	1
Foreign languages	5	2	2	4	4	1	3
Mathematics	2	—	2	2	2	1	2
• Photography	1	1	1	1	—	—	1
• Pottery	1	1	1	1	1	1	—
Science	1	1	1	1	—	—	1
• Tapestry	—	—	1	1	—	1	1
• Drama and poetry	—	1	1	—	—	2	1
Manual work	—	1	1	1	1	1	1
TOTAL	18	16	16	15	18	17	19

Source: Internal document of the school, May, 1972.

Notes: — The "ateliers" are organised every afternoon, with two sessions per day (except Friday), i.e. seven sessions or periods per week. Every fortnight each pupil has to choose a new "atelier". The aim of the teachers is to have each pupil participate in a wide variety of "ateliers" in the course of the school year.

— While the organisation of numerous "ateliers" taking place at the same time offers a wide range of choice, it raises problems of space. There were no suitable facilities in the school for the activities marked • and these were organised thanks to improvised arrangements made possible through the initiative of the teachers.

hours a week are spent on « freely chosen work » in addition to four hours of optional subjects proper.

d) **Options as a choice of themes within a field of study defined in the curriculum.** In certain subjects specified in the curriculum, the same question may be dealt with from different points of view or on the basis of different themes. This is particularly true of inter-disciplinary studies (sometimes called integrated subjects) where the disciplines do not impose the rigour of their own logic. Thus, in a particular school one may find a group of classes working for several weeks on the same field of study — say the United States of America. After a few joint introductory sessions, the pupils split up into groups according to their interests, each group exploring a different theme within the field of study — the racial problem, the conquest of the West or the big American cities. These themes may be proposed either by the teachers or by the pupils. Their choice is largely independent of ability and is based mainly on the interests of the pupils.

e) **Options as a choice within a method of teaching.** This category may cover several kinds of choice open to pupils in the course of their school activities. In the type of work described under (d) above, the distribution of pupils by roles or tasks may depend on their own free choice. In the research or exploratory stage of the study of a theme, some may choose to work from documents, while others may prefer to carry out a small investigation. In many areas involving expression (mother tongue, foreign languages, the study of a theme in connection with « integrated subjects » history, geography, etc.) it is common to leave each pupil free to choose his mode of expression or the type of work he undertakes to prepare from a range of possibilities presented or suggested to him. Finally, under a more elaborate, but less widespread practice, teaching makes use of a number of documents and aids (printed or not) which make it possible to change the role of the teacher and to develop the pupil's independent work. The use of these aids is not necessarily uniformly programmed and it is possible for the pupil to choose out of an available set the one which he will use at any given moment.

20. It will thus be seen that a system of options is always linked with freedom of choice. This choice is more or less open, and this freedom more or less real, according to the availability of the alternatives offered. One problem will therefore be to ascertain the resources which give concrete form to these possibilities — teachers, accommodation, equipment; what should be their quantity and nature; how far should their necessary diversification be carried if the risk of their underemployment increases proportionately to their diversification ? Another major problem is how far all the possibilities can or should be predetermined. In general it is the educational system or the teachers or the resources available to the school itself that determine the possible range of choice. But can the pupils (or their families) ask to go beyond this range ? If the school organisation allows it, are the resources adequate for this extension ? Or are the possibilities of choice irrevocably determined by the facilities available to the school ?

21. Finally, the choices are by definition random and unpredictable. The distribution of pupils by activity chosen is therefore likely to vary every time a new choice has to be made [it will be noted that new choices are more frequent in type (c), (d) and (e) options than in types (a) or (b)]. Must we accept the fact that the available resources limit these variations and therefore restrain the freedom of choice or must we adjust the available resources and give them a flexibility which allows the widest possible freedom of choice, and if so, how ?

Part two:

THE FUNCTIONING OF THE MULTI-OPTION SCHOOL

22. In the first analysis, it can be said that the most appropriate facilities for the multi-option school are those which enable it or encourage it to function as closely as possible in line with the expectations arising out of the needs defined in Part One and the corresponding general objectives. It is therefore quite understandable that, in nearly all projects, the design of these facilities is accompanied by an effort or attempt, first, to clarify, formulate and even formalise these objectives, and, secondly, to ensure that the architectural proposals put forward are consistent with the objectives they are intented to meet.

23. This work of alignment makes use of intellectual tools called models, the main purpose of which is to link the conceptual aspect with the operational aspect in the development of a project. A model is a simplified scheme or image giving an advance representation of what is expected of a school of the relevant type, for our purposes the multi-option school. The object of Part Two is therefore to explain how these models enter into the preliminary work, and then to define what might be an appropriate model for the provision of facilities for the multi-option school.

I. General aspects of the use of models

24. It is a truism to say that every school building project refers to models, and particularly to an educational model. The fact that these models are conscious or unconscious, explicit or tacit, is independent of their real role and of the reality of their occurrence. From this point of view school building projects and their implementation do not differ between the traditional type of schools and multi-option schools. But the positive contribution which the construction of multi-option schools has made to the methodology of school building is that their innovatory character necessitates the elucidation of their reference model.

25. In many countries the instructions given to architects for the construction of the current type of schools, resulting from official texts and norms in force, consist essentially of schedules of accommodation accompanied by a few comments and technical specifications. The underlying assumption is that the dominant educational model from which these prescriptions proceed is the subject of consensus and that its implications for building are therefore immediately clear to those who have to carry out the projects. Communication between « sponsors » (educationists, administrators) and « designers » (architects) is then based on reference, often implicit, to an educational system and a cultural background common to both parties and therefore immune from any challenge.

26. When it comes to designing facilities for the multi-option school, it is no longer possible to proceed on such assumptions and it is therefore necessary to elucidate the new models. This explicit reference then plays a twofold role. Inside the design team it makes it possible to establish communication, which ensures that all the members of the team have the same understanding of the aims of the project, since an intuitive knowledge of these aims is always insufficient in the case of an educational innovation. For people outside the team (authorities, other teams, educationists, the general public) this reference also serves to justify the project and make it acceptable, especially by clarifying the reasons for a new use of available resources.

27. Models are not always presented as such. SAMSKAP (the organisation for school building cooperation between local authorities in the Malmö region, Sweden) uses theoretical models which are then translated into briefs and plans for particular schools. On the other hand, neither the term nor the idea are ever used by those responsible for SEF (Study of Educational Facilities, the school building design and planning agency of an industrialised system in Metropolitan Toronto, Canada) and do not appear in the documents. But, in the first place, the striking similarity of the different schools built and, secondly, the systematic and highly structured character of the manuals published by that agency (1) disclose a clear intention to link the architectural proposals as closely as possible to a conception of the school. The « Building Bulletins » issued by the Department of Education and Science of England and Wales make little explicit use of the idea of a model, but in the Bulletins numerous references to the concept of the school are introduced to support the description of the architectural projects covered. In contrast, the documents issued in connection with the construction of the new German *Gesamtschulen* make more frequent reference to the idea of a model (2). It can therefore be said that all the design teams encountered in the course of this study refer to an alignment of the aims and principles of the new type of school with the design of the facilities provided.

1) The manual corresponding to the multi-option school as we have defined it is entitled: **Educational Specifications and User Requirements for Intermediate Schools**, SEF E2, Ryerson Press, Toronto, Canada, 1969.

2) See for example the presentation booklet : **Integrierte Gesamtschule in Fröndenberg Kr. Unna Teil 1**, Architektengemeinschaft, 1000 Berlin 30, Ahornstrasse 4.

II. Characteristics of the models brought into play by the design of facilities for multi-option schools

28. As indicated above, the models referred to by most of the projects or experiences studied involve two common characteristics: they give the most coherent possible representation or image of what is desirable, and they attempt to forecast the expected state of affairs, or in other words to apprehend in advance the achievement of what is sought.

29. The models brought into play by the design of facilities for the multi-option schools generally ensure their coherence by reference to a body of educational principles, often expressed in negative form or on the basis of a criticism of the traditional educational system. Table 3 gives two examples of a body of principles defining the concept of a school with a view to determining the most appropriate buildings and equipment. The first (A) summarises the main points in a chapter setting out guidelines in a manual of specifications addressed to those responsible for school building, and the second (B) is the result of an analysis of documents carried out by a team responsible for evaluating schools already built.

30. More generally, these principles may be said to express the main choices regarding the multi-option school with respect to:

a) **school organisation**; organisation on the basis of the class group is rejected in favour of a flexible organisation allowing differentiation and individualisation of education;

b) **educational content**; uniform curricula structured around independent subjects are replaced by adjustable curricula (choice, options, differentiated paths) desegregated and partly integrated;

c) **form of teaching**; this should no longer be centered on the teacher, but on the « resources » available in the pupil's environment (including the school); the dependency of the pupils must give way to a process of self-learning;

d) **main functions of the school**; these are not confined to teaching in the strict sense, but should include a twofold social function, the openness of the school to community life and the development of the school's own internal social life, which sometimes aims at being a microcosm of democratic life.

TABLE 3

Two examples of a body of principles defining a concept of the school with a view to the determination of facilities

A) Principles of organisation of the multi-option school under the SEF programme, Toronto, Canada (1)
1. Flexible and non-hierarchical organisation without reference to age or level (the non-grading principle).
2. Extension of individual work based on the responsible use of diversified « resources » (self-learning aids).
3. The curriculum conceived as an individualised integration of multiple activities (the open-ended principle).
4. Integration and balance of the various subjects.
5. Participation of the pupil in his own education.
6. Education based on teacher co-operation.

B) Basic principles laid down as starting points for the design of SAMSKAP Schools, Malmö, Sweden (2)
1. Adaptability of the facilities.
2. Integration of the school with various social activities.
3. Variation in the activities of the pupils.
4. Variation in the grouping of the pupils.
5. Teamwork of the teaching staff.
6. Co-ordination of the various subjects.
7. Availability of a wide choice of resources.
8. Integration of remedial teaching.

Sources : (1) Based on SEF E2, op. cit., pages 27 to 32.
(2) Based on De öppna skolorna i Malmöregionen (The open plan schools in the Malmo region), published under the direction of Bertil Gran, Lärarhögskolan, Malmo, Sweden, 1972, page 12.

TABLE 4:

Breakdown of time spent on various forms of work in the traditional model and in the innovative model of secondary education in the experimental district of Skelleftea "Sweden"

	Traditional model	Innovative model
1. **Teachers (percentage of time spent with pupils)**		
— Teaching in class/large group	45.0	14
— Individual tuition, stimulus, etc.	46.5	66
— Leading and listening to oral tests and accounts, etc.	5.0	9
— Leading diagnostic tests, written and oral accounts	3.5	10
— Evaluation of work together with the pupils	0.0	1
	100.0	100
2. **Pupil's working methods (percentage of pupil time)**		
— Teacher-led instruction	45.0	14.0
— Individual or group work by pupils	46.5	61.5
— Miscellaneous: reporting, diagnostic tests, evaluation	8.5	24.5
	100.0	100.0
3. **Grouping of pupils (percentage of pupil time)**		
— Pupils working individually or in pairs	10	34
— Pupils working in small groups	40	43
— Class tuition	50	23
	100	100

Source : Based on S. Marklund: "The Role of the Teacher in Educational Innovation in Sweden" in **The Teacher and Educational Change: A New Role, General Report**, Vol. I, OECD, Paris, 1974, page 318.

31. In conjunction with these educational choices, the models describe the expected functioning of the schools to be built. This functioning is the product of innovatory experiences but it is at the same time the expression of a will to change established practice. Table 14 describes an example of the changes recorded in schools of a new type as compared with schools of the traditional type. More generally, it can be said that the models adopted prescribe changes in the following aspects of the functioning of the school:

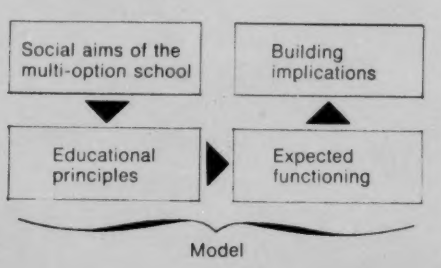
a) **Changes in the nature of activities.** The known activities of the traditional school are dealt with in an appreciably different way; the pupils work singly or in pairs more often and in classes of the usual size less often;
activities generally reserved for a much more advanced level of studies (work on programmed material, library work, etc.) become current and usual for young adolescents;
new activities appear (e.g. self-learning activities, project work, planning by pupils of their own work, etc.).

b) **Changes in length and pace.** The uniform pace, under which school hours are broken into periods of equal length (40 minutes or one hour) is doomed to disappear in favour of a combination of shorter modules (the Swedish *Läroplan* advocates modules of 20 minutes) allowing greater diversity in the effective length of work periods or in working methods within the same period.

c) **Changes in work organisation.** The aim is to go beyond the monotonous teaching practice where all pupils of the same level (or the same class group) do the same thing at the same time. A greater flexibility of timetabling should allow a diversity of tasks to be carried out at the same time in the same group (or set of pupils).

III. How these models are used

32. At first sight, it seems natural that the definition of the facilities needed by the multi-option school should be inferred from the models which specify the concept of these schools. In fact, the work of a great many teams clearly seems to be based on the assumption or belief that there is a logical link between educational concepts and architectural proposals. The SEF report (1) asserts the principle that « educational functions and requirements should determine design form ». If the word determine is given its full force, then it is clear that from this point of view it is a logical imperative that the buildings be made to depend strictly on the educational concepts. This might be expressed as follows:



33. In reality it is always difficult to see how the transition is effected between the terms of this chain. For example, the same SEF report juxtaposes, in order, data on the psychology of the adolescent in modern society, the major trends of modern education which characterise the intermediate school, and the description of the various components which should make up this type of school, preceded in each case by the functions which that component must fulfil. But this juxtaposition presupposes a logical continuity rather than explaining it. This belief in continuity is often voiced after the event by architects and those responsible for building. However, this continuity becomes really clear only after the projects are formulated, and an understanding of how it is established would make it possible to draw valuable lessons from the various realisations. For this purpose what must be questioned is not the validity or the interest of the solutions proposed for multi-option schools, but the methodological assumption. Is the design work purely deductive once the educational concept is defined ? Should the word « implications » included in the title of this study be interpreted in its logical significance ?

34. Our observation of the various projects or school buildings and of the work of design teams (insofar as such work can be observed after the event) seems to us to imply a negative answer to these questions. Some light may be thrown on this point of view by the following comments:

a) Schools inspired by the same educational principles and built at the same time may differ totally in their architectural expression.

Example 1 - The two *Gesamtschulen* of Fröndenberg and Scharnhorst in Nordrhein-Westfalen are built according to two different plan layouts; the first is based on a unit of space *(Grossraum)* of 250 m2, which accommodates a working unit of 105 pupils with three teachers, for activities which are initially common and subsequently differentiated. The same educational formula is put into practice at Scharnhorst in units of four enclosed classrooms of the current type, two information rooms for large groups being available for all the units of four classrooms (see figure 2).

Example 2 - The same value attached to information activities, and the same principle of the maximum availability of educational resources may lead to the library or documentation centre being located in the middle of the building at the exit from all the classrooms (SAMSKAP solution, adopted and reinforced at Fröndenberg) or on the contrary to the dispersal of a large part of these facilities, which are located in the various sets of accommodation (the solution proposed for Maiden Erlegh, see para.104).

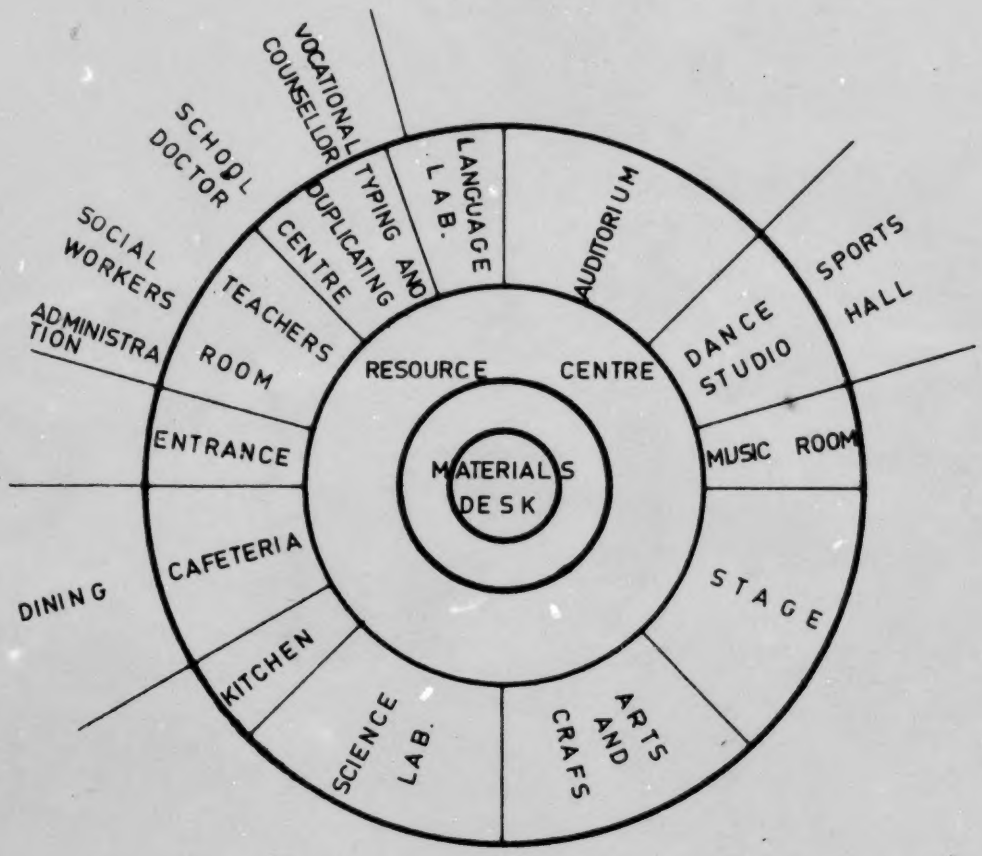
It can therefore be seen that there may be several responses to the same need or the same principle. Those responsible do not generally voice any certainty as to the superiority of one solution over another; they are more commonly conscious of the need to make choices during the process of formulating projects and of the difficulty of setting those choices in a deductive context.

b) Models come into play at different moments; some designers distinguish between educational models and architectural models, the former being closer to what has been described above, while the latter consist of diagrams showing relationships between spatial elements. The circular diagram used to define the SAMSKAP schools (2) and the diagram illustrating the design of the Fröndenberg *Gesamtschule* (3) can be regarded as examples of this last type of model. But it is still difficult to see how the transition is made from one type of model to the other, from those which are expressed in conceptual terms to those which are already operational. Furthermore, the architectural models themselves must be translated into specific projects which sometimes differ appreciably from each other. The result is that the question arises whether the translation of the model into a project is not more important than the construction of the model. The Fröndenberg design team, for example, would answer that question in the affirmative; it in fact considers that the first diagram (which nevertheless still heads the booklet introducing the school) was considerably modified by the work of the team; the educational concept evolved

1) SEF E2, **op. cit.**, page 37.
2) See figure 1.
3) See page 68.

FIGURE 1

Model of the SAMSKAP schools in diagram form



and became more precise; technical and practical reasons substantially modified the model.

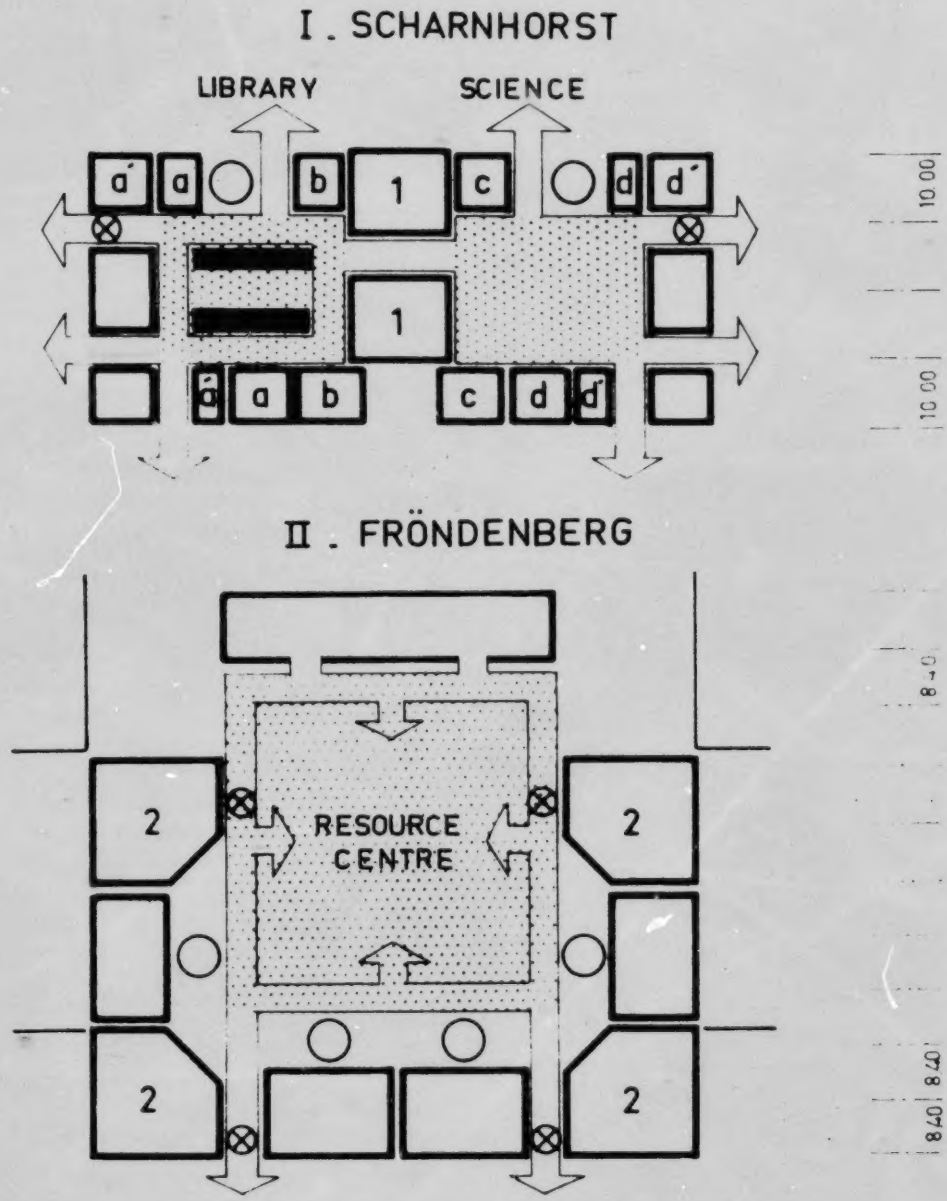
c) The habitual use of models does not seem very effective. They are indeed too often given a normative and wishful character; in other words, they prescribe a functioning for the multi-option school without specifying the factors which condition it. Now it is easy to see that the functioning which can be observed in innovatory schools differs appreciably from the functioning prescribed, that is to say the functioning which should serve to define the demand for facilities for the new schools. It may also be asked whether the models are not most often confined to a minor role, reduced to no more than an image of models « in the uninteresting sense that a tin soldier is a model of a soldier » (1). In the course of our studies we have encountered no truly operational use of models. Now, models of how a school is to function are necessary as instruments of forecasting, particularly so as to « anticipate problems » (2). This role does not conflict with that which they already play as instruments of communication, as we have indicated above, but it does go beyond it and gives models their real meaning.

d) Finally, it seems that the coherence of the principles which define the models should in turn itself be questioned. In fact, actual reality shows that it is not easy to reconcile all these principles and that many internal tensions necessarily arise in a dynamic school society. This is, moreover, the conclusion reached by the evaluation study which was carried out on the functioning of the first SAMSKAP schools in the Malmö region and the purpose of which was to find out whether the principles underlying the

1) **The Management of Innovation in Education**, Centre for Educational Research and Innovation, OECD, Paris, 1971, page 22.
2) **Idem**, page 25.

FIGURE 2

Two different schools based on the same educational model



Two schools were built in the same year and in the same region on the basis of the educational model of the *Gesamtschule*. In I, the groups of pupils are deployed into four classes (a or a', b, c, d or d') from each of the large information halls 1; in II, the large classrooms 2 make it possible for a 105 pupil unit to receive collective information and then to work in groups of various sizes. In I the open areas are primarily used for social life and in II for study activities.

concept of these schools were in fact matched by what went on in their new buildings. « The principles on which the work of the SAMSKAP group and the design of the open schools have been based cannot be simply placed beside one another to give some kind of total cumulative effect. Often they must necessarily conflict. In the individual case, whether it concerns the layout of buildings or teaching, one is often forced to give one principle priority over another. It is not possible to decide upon a system of priorities that will then apply once and for all. For this reason different practical solutions are produced, even though the basic principles are the same » (1).

IV. The functioning of the multi-option school and its internal tensions

35. Most of the schools demonstrating new building solutions that were visited in the course of this study had only recently been constructed; their functioning often still remained incomplete, either for lack of material or equipment, or for lack of staff, or more commonly because the staff had not yet discovered or integrated all the behaviour patterns necessary to adapt their work to the new instrument they had to use. It was therefore impossible to draw any lesson from their experience by merely observing their activities. On the other hand, it proved fruitful to consider the problems facing them and the tensions between various aspects of their activity. Beyond their difficulties due to circumstances, the fundamental character of certain problems was very evident. It followed that the question was not so much that of understanding how new facilities made it possible to apply innovatory educational concepts, but above all of understanding how the facilities intervene — as one factor among others — in the way in which the school tackles and handles the problems it cannot evade.

36. This comment is only made to underline the deceptive character of approaches which deem it possible to deduce architectural specifications from educational principles. Such approaches derive from an optimism which masks the problems or attributes the difficulties to constraints external to their model. Now, if models can be used to anticipate problems, it is because they are themselves problematic. For example, it cannot be said that there is a pedagogy of freedom which can be encouraged by this or that type of facility; there is in fact an educational problem of free choice and of compulsion, and it is this tension which has to be faced by the designers of the school as well as by those who have to run it. We shall therefore now consider the main tensions which must be integrated in the model for the multi-option school.

A. Common Core and Options in the Curriculum

37. In a democratic society the school must provide young citizens both with a common frame of reference and with a training in freedom of choice which implies a certain differentiation in the programmes followed by different individuals in the course of their education. The choices gradually determine the orientations, thus fixing differences and limiting the importance of common references. The co-ordination of these two objectives is important because it is closely linked with the essential characteristics of the multi-option school as shown in paragraph 16. But it is difficult and does not come about with balance or harmony; quite the contrary, freedom of choice is always threatened by the tendency of the organisation to become frozen in its structures; similarly, common education is always threatened by the dispersion of choices. This is the explanation of the evolution of certain education systems such as secondary education in Ontario or the Swedish Basic School, in which the importance of options in the programmes has varied from time to time, tending alternately to opposite extremes (2).

38. The *Collège de Sainte-Maure-de-Touraine* (France) gives an interesting idea of a tension of this kind. It provides innovatory education in facilities of the old type and options play an important part. They are organised every afternoon as a complement to the compulsory activities conforming with the official programmes, subject to a few adjustments. The problems most acutely felt by the teaching staff are the following:

— How to get over the fairly wide separation between the pedagogy of freely chosen subject areas and compulsory ones ?
— How to increase real freedom in optional activities ?

At the present time, in effect, the great dispersion which would result from the organisation of twenty optional « ateliers » which between themselves lack coherence, is offset by the compulsory rotation of pupils between the various « ateliers » and the imperative limitation of the numbers in each of them. In this way constraints are again introduced into this pedagogy of free choice. Furthermore, there seems to be a wish to get back to a common education through the combination of the numerous choices which each pupil is obliged to make.

39. Do these internal contradictions amount to a weakness in the system or are they a factor in the educational drive of this team ? It would be interesting to look at this question.

— As regards the facilities, this team has had to ensure that the choices it wanted to offer were made physically possible by making spontaneous alterations in a building unsuited to the form of education chosen; rigging up a pottery workshop in the basement, art and drawing studios, a vivarium and an experimental glasshouse in the school stores. In this field, too, significant contradictions emerged. Even more than the availability of teachers, it is the inadequacy of certain facilities which perforce limits the choices.
— The shortage of resources makes competition all the keener between the provision of new possibilities for optional activities and the adaptation to the new methods of the accommodation reserved for compulsory activities.
— The optional activities and the common core activities co-exist poorly in specialised accommodation, such as science laboratories. This specialised accommodation is in fact adapted for teaching of the frontal type which is in conflict with the spirit of the system of options; the optional activities call for continuity, for project work, and therefore for the possibility of leaving current work and assemblies set up, all things which are impossible in accommodation used for common core activities.

40. Leaving aside this example, which is almost an example *a contrario*, so unfavourable are the conditions in which the problems have to be tackled, we can say that the facilities of the multi-option school are affected in two ways by the tension described.

a) At the briefing and design stage, insofar as the school organisation provides for a common core and optional activities which the pupils take up in a way which is not predictable, a distinction must be drawn between what can be quantified in advance with some precision and what cannot. This process is more fully explained in Part Three. But it is already quite clear that the non-quantifiable introduces an element of uncertainty into the planning. In particular, there is a danger of arriving at situations in which accommodation provided for some optional

1) Gran, op. cit., page 215.

2) These are mainly options as defined in paragraph 19 (a), (b) and (c).

1. An improvised language laboratory
Collège de Sainte-Maure-de-Touraine (France)

of these possibilities. The facilities are not the sole source of possibilities to be taken into account in understanding this question, but it is quite clear that they partly determine this development. The problem for designers is therefore to find out what types of facilities afford the widest range of possibilities. This range is necessarily limited, for obvious reasons; the facilities therefore set limits to the freedom of choice. In practice, this limitation is relative and depends on the behaviour of the users. It is not unusual to find that the possibilities afforded by the facilities are far from being fully used.

b) The development of optional activities depends on the possibilities offered to them, and particularly on the diversity

B. Common Education and Diversity of Attainment: Heterogeneous Groups and Differentiated Groups

41. Paragraph 15 (c) stresses the importance of differentiation in the pedagogy of the multi-option school. This principle is, however, interpreted in different ways in the actual functioning of schools:

— Sometimes internal differentiation predominates; for example, a heterogeneous group, constituting a unit, is given common information and then splits up into sub-groups which follow up this information and handle it at different levels or from different aspects; it is also from this unit that the pupils split off into options.

— Sometimes the differentiation is external; the sub-groups are already in existence, as it were, before the distribution of the pupils, who are assigned to them, for example, according to aptitude. If this aptitude is determined once and for all and defined as general aptitude, the result is organisation by groups of the same general level (streaming) which is in conflict with the aims of the multi-option school. If it is defined for a given subject, the result is ability groups by subject (setting).

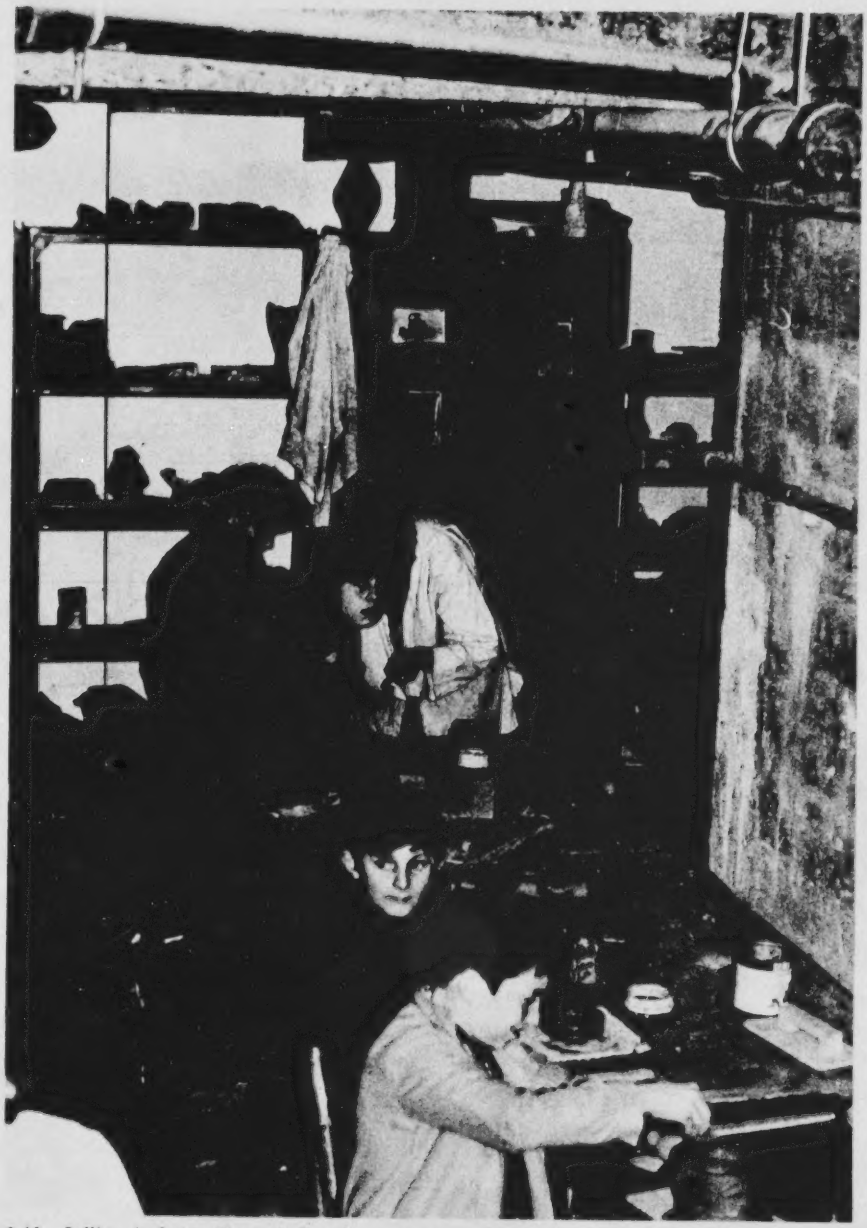
42. In fact, these are not opposing types of methods, but merely tendencies of which it can be said that one seems to prevail in one school and the other in another. For example, the new German *Gesamtschulen* in Nordrhein-Westfalen are developing the first tendency, in reaction against the situation in the first schools of this type, mainly in Berlin, where the practice of too systematic an external differentiation resulted in rigid setting. The two tendencies are, in practice, interlinked, as though one were the obverse of the other; there is an inevitable tension between them. The heterogeneous groups, providing common education for children with different backgrounds and skills, originated in the desire to break down the segregation of the traditional school. But equalisation of opportunity is not necessarily attained by subjecting all children to the same treatment. That is why differentiation is introduced within these groups, particularly to help children less favoured from the socio-cultural point of view, who are penalised by strictly equalitarian education. But differentiation in turn generates difference; the complexity of the school organisation, the pressure of parents or examinations, and sometimes the acquired

habits of the teachers, mean that the differentiated sub-groups become stabilised and acquire a certain autonomy and that the reference to the heterogeneous group is whittled away. The multi-option school is then threatened by the return to segregation into groups with different skills and socio-cultural levels.

43. Do the nature and organisation of facilities play any part in the dynamics of these tensions, which arise mainly from the educational organisation of the school ? Undoubtedly they do, as is shown by certain examples; at Scharnhorst (1) differentiation operates among a group of pupils (140 - four classes) occupying a unit of four areas. This means that the distribution of pupils must be limited to four sub-groups of equal size. One also often finds a lack of an extra corner or an additional area to vary the work in the course of a period, whereas this extra space could easily be found if it were possible temporarily to regroup a larger number of pupils than each of the classrooms can accommodate.

44. At Fröndenberg, in contrast, the big room where 105 pupils and three teachers work simultaneously theoretically allows a more flexible use of the unpartitioned space. In practice, however, the physical characteristics of this room, and particularly its acoustic qualities, only allow two extreme types of group, the big group of 105 or the small group (6 to 8). Now, experience has shown, contrary to what was thought by the team of educationists associated with the design, that it is impossible to keep to such a narrow range; medium sized groups are necessary in this type of teaching/learning situation and they are difficult to fit into the open space.

45. It is thus found that the nature of the facilities may impose limits on differentiation, with the result that it then obeys imperatives other than those springing from the life of the groups themselves. Facilities also enter into the « openness » of the sub-groups (the possibility of a pupil changing from one sub-group to another) as well as into the link between differentiated sub-groups and the heterogeneous group. One of the justifications of the « open plan » is precisely that it allows at the same time the organisation of sub-groups occupied on differentiated tasks, the variation of their respective size, their openness, and the constant recognition of belonging to the heterogeneous group. It must not, however, be assumed from this that the open plan in itself can solve all the tensions described. It can sometimes be seen, for example, that rooms are reconstituted in the open space using furniture as partitioning to separate the sub-groups from each other, just like traditional classrooms.



1 bis. Collège de Sainte-Maure-de-Touraine
Improvised pottery workshop in a basement.

C. Remedial Education and the Integration of Minorities (Handicapped Children, Immigrants)

46. The measures of compensation or support taken in the interests of less favoured children may run counter to the principle which inspires them; a true democratisation tries to lessen inequality of opportunity. These measures, in effect, presuppose special attention, special classes, activities run by special staff and an education which is generally called « special ». Now, many schools with options have refused to allow this special education to be isolated in special classes and integrate handicapped children (whether socially and culturally, psychologically or physically) as far as

1) Paragraph 34 (a) Example 1.

possible by giving them access to the same classes and activities as all the other children. This organisation, however, presupposes the continuance of certain measures of support and compensation, in the absence of which inequalities will be accentuated.

47. This tension is only one aspect of the foregoing, but it has been thought worthwhile to stress its specific character in view of its relative novelty and the interest of the various solutions that have been found for it, such as the provision of special accommodation for « consultations » (special sessions with certain children who temporarily leave their classes) and the fitting up of the accommodation, including workshops, to enable them to be used by the physically handicapped. In fact, it often happens that these measures emphasise the difference and are carried on in places clearly identified as intended for people who are not like everybody else. An example was seen of small glazed cabins in the study hall of a school where the « consultation » sessions for backward children were held; the size of the cabin and its transparency made these children, who were receiving special attention, visibly apart.

48. To the problems already indicated concerning the part played by facilities in the matter of differentiation one must therefore add those arising out of the following questions:

— What areas are really needed for the special treatment of children in great difficulty ?
— What are the characteristics of these areas ?
— Finally, and above all, where should they be located to allow the best possible integration of these children in the school community ?

D. Specialisation and Subject Integration

49. One of the objectives of the multi-option school is to promote knowledge the comprehensive character of which is restored in spite of the cleavage between specialities which characterises our Western culture. This objective springs from the desire to avoid any premature specialisation, to open the way to the discovery of the problems of real life which call for a multi-disciplinary approach and to pass on at school level the effects of the recent trend of the sciences to become inter-disciplinary. Experience, of course, shows that this principle is difficult to put into practice and that, in fact, the dynamics of school life disclose a tension between this attempt to be all-embracing and the tendency towards specialisation and the compartmentation of particular fields of knowledge. There are several reasons for this:
— institutional reasons: as a secondary school, the multi-option school has a specialised staff; its curriculum is, in almost every case, constructed on the principle of separation of subjects;
— socio-cultural reasons: the prestige of the university and the expectations of the parents enhance the value of specialisation; concern with working careers has the same effect, while the cultural context is still strongly marked by the positivist and analytical concept of the sciences.

50. The multi-option school has tackled this problem in a number of ways which are often very elaborate; some idea of them can be formed by looking at the activities which they generate:
— common activities conducted by a number of teachers in different subjects with the same group of pupils;
— the « project method » under which a theme is explored by pupils with the aid of a number of teachers, or better still, a collective task is performed involving reference to a number of disciplines;
— timetable « blocks » are allotted to a set of subjects.

51. The tension between specialisation and pluri-disciplinarity is manifest even in specific activities, either because teachers tend to regard pluri-disciplinarity as a prolongation of their own speciality or because the highly structured disciplines (mathematics, sciences, languages and the like) impose their own learning logic. Almost exclusive attention, moreover, is generally paid to the significance of options as orientations towards specialised activities [in the sense defined in paragraph 19 (a), (b) and (c)] while their function of orientation towards the different aspects of knowledge [paragraph 19 (d) and (e)] which is much more favourable to pluri-disciplinary work, is quite often disregarded. Finally, the broadening of the field of knowledge is too often contrasted with the deepening of specialised knowledge, as though there were some contradiction between these terms, whereas an education of the modern type should manage to combine them.

52. As regards facilities, this tension is of the utmost importance. We see, in practice, that pluri-disciplinarity raises the problem of communication and of the convergence of specialised activities and subjects. Part Three of this study will pay very special attention to what is known as the departmentalisation approach to the programming of facilities. It is enough to say here that if the design of facilities is based on the distinction between disciplines, it becomes all the harder to cope with the problem of communication in the accommodation provided. The search for activities common to the different disciplines constitutes an

2. Integration of handicapped children through their participation in common activities in a Basic School at intermediate level (9 to 12 years), Malmö (Sweden).

appreciable improvement on these approaches. This procedure, too, is analysed in Part Three. It allows the design of facilities which make it easier to take on the tensions between pluri-disciplinarity and specialisation. It is well known that elements of a very new type have been worked out in this way, such as mediathèques, resource centres, open general purpose areas, facility sets combining specialised workshops and project areas (1).

53. But it cannot be said that these new types of facilities resolve the tension described; the available space may favour communication and encourage its development, but it does not create it; often enough the space affords more opportunities for communication than teaching practice is prepared to use. It is even found in some cases that teaching pratice rejects these possibilities of communication; doors may, for example, be blocked up, various obstacles may be erected in areas designed for the convergence of activities, general purpose areas are sometimes taken over or appropriated by activities of a single type; facility sets constructed for the convergence and interpenetration of a set of activities may become self-centred and may isolate themselves from the other activities of the school. More generally, it might be asked whether this tension does not have repercussions at the stage of the design of facilities. Can priorities be set between the creation of communication networks between specialised areas and the creation of areas for inter-disciplinary purposes ? It is easier to recommend a balance between these two poles than to achieve it, particularly when limited resources make it essential to make a choice.

E. Individualisation and Social Life

54. There is another tension, and sometimes even a conflict, between the metimes even a conflict, between the objective of the individualisation of education and the objective of socialisation, both of which are characteristic of the multi-option school. In this type of school where, in the extreme case, each pupil may have his own programme of studies, where the capacity for independent work is developed and where work in very small groups is extended, it may well be asked whether the feeling of group membership is not eroded, though it is regarded as essential to the socialisation of adolescents in school life. If, as often happens, activities which encourage social relations (sports, clubs, tutorials) are developed alongside teaching proper, this only partly solves the problem. Is it not in the work itself that a rich social life should be created ? Does the frequency of work in small groups allow the establishment of relations, not spontaneous, but nonetheless necessary between adolescents who have no special affinity or common social background ? Is it not in medium sized working units that these relations can develop and that the great need for collective expression, collective production and collective decision can be satisfied ?

55. Individualisation also leads each adolescent to act and work in different groups, whereas the most widespread conviction of educationists is that socialisation implies the identification of each individual with a stable group. Should not the experience of the multi-option school provide a true test of this hypothesis and perhaps lead to the discovery of other roads towards good socialisation, notably by the development of simultaneous membership of several groups, or collective participation in a creative project, both of which may result in an enrichment of social relations. But it is not easy to strike a balance between the need for the individual to find his true position in relation to others, and the fruitful multiplication of social relations.

56. From the point of view of the layout of spaces, the facilities provided for individualised work may prove unsuitable for the life of those social groups to which the traditional school sometimes assigns a classroom. The problem of the appropriation of an area by a group is more acute in the new schools where everything is designed for the maximum flexibility of groups and activities. Inquiries and observations have shown that the most handicapped children suffer from these difficulties more than others. The open spaces which are suitable for individualisation give them a feeling of insecurity and heighten their sense of isolation. Some of these children have been found to display alienation and aggression (pilfering, vandalism) more particularly in these areas. It is indeed by no means certain that sense of security is the essential element to be taken into account in the social development of adolescents or even that the nature of working areas is a decisive factor in the feeling of security or insecurity.

57. Finally, the appropriation of space needs reconsideration. It is not necessarily linked with the habitual occupation of one classroom by one group. If the design of the Scharnhorst school, as we have already seen, differs from that of Fröndenberg, it is, among other reasons, because of the desire to provide medium sized groups with a place which will serve as a base for their activities and the walls and equipment of which they can use at their own discretion. This solution seems in practice to be a happy one, but there is nothing to indicate whether this is because it is adapted to the social needs of the pupils or because it is still close to the organisation by class group to which they were accustomed in their earlier schooling. It is therefore impossible to generalise on the basis of this particular case.

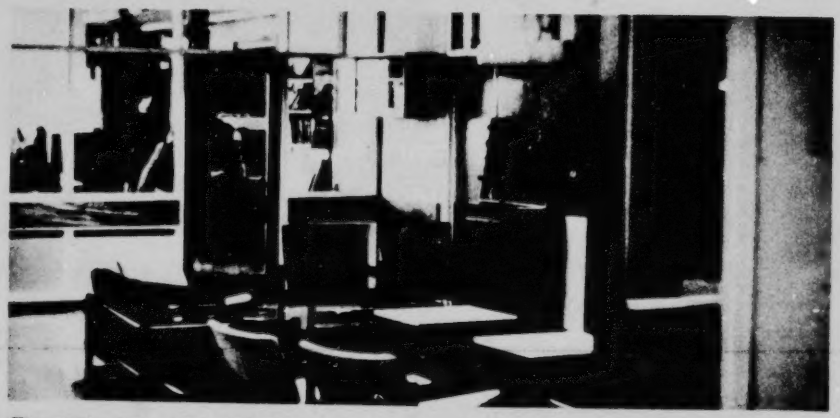
58. In fact, the multi-option school is developing a fairly new type of social life. It is therefore easy to understand the interest of certain formulae which link the spatial layout with a progressive initiation into the way of life of the multi-option school. An example, as will be seen in Part Three, is Maiden Erlegh, where the children in the Lower School (the first two years of secondary schooling) have the use of a set of facilities in which 80 % of their activities take place. A recent study (2) for the *Gesamtschulen* of Nordrhein-Westfalen proposes a solution of this kind. With a view to stabilising social life as a condition for the optimum flexibility of differentiated and individualised learning, it proposes different spatial layouts for the three two-year phases which go to make up secondary education — orientation, compensation and option. In the first phase, in particular, the children have an area which can be appropriated in full, a group of 140 pupils having a unit of four classrooms in which the bulk of their activities take place. In the succeeding phases the social base of the big group is a « house » which is largely general-purpose and more complicated in structure, including, in particular, a large information hall, common to a number of « houses ».

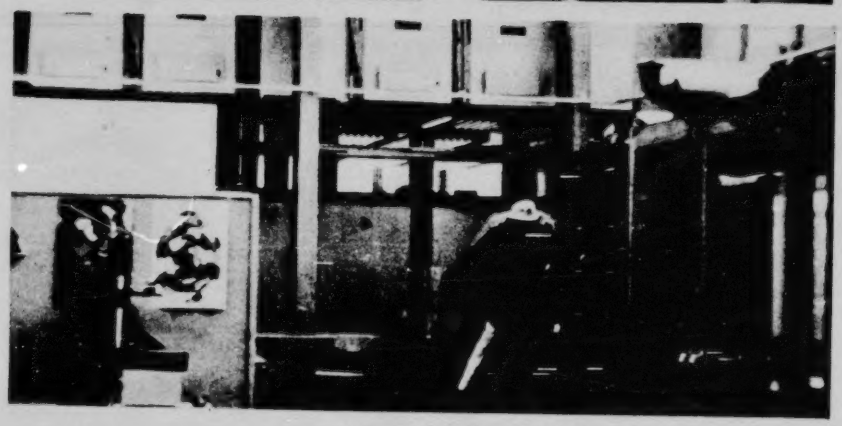
F. Social Life and Social Organisation

59. This tension is complementary to the latter and partly overlaps with it. We shall therefore add only a few comments to what has already been said. If social organisation has assumed an important place in the multi-option school, it is because, in a heterogeneous school population, optimum social relations are not established spontaneously or automatically, as often happened in selective schools where the majority of the pupils came from the same social class. It should, however, be pointed out that, in these schools, the real social life of the pupils does not coincide with the planned social life which it is intended should result from the organisation. This is common knowledge, but its significance often passes unperceived. A school is in fact a society with its own laws, its own *mores* and its own rules, since it is the young people themselves who organise their society. Educationists are

1) See in particular, the arts and crafts centre of Henry Fanshawe school, Dronfield (England), page 59.

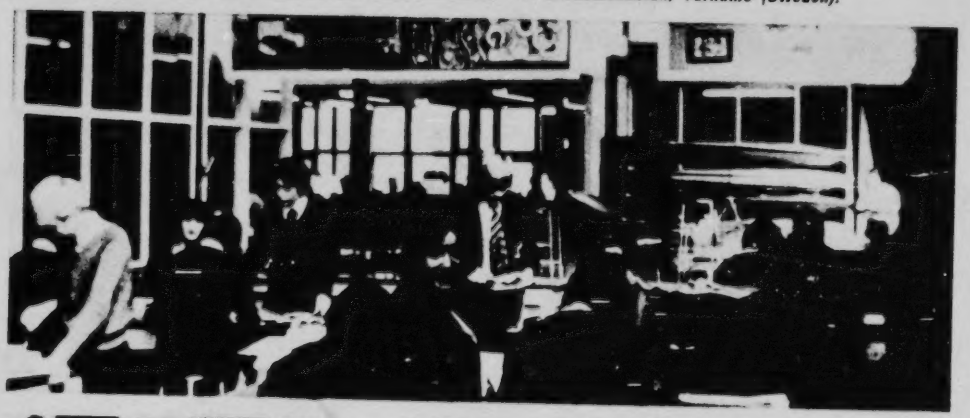
2) H.G. Rolff and K.H. Koch : **Gutachten zur Raumstruktur von Schulen unter dem Gesichtspunkt der Differenzierung und der Stabilität der Sozialen Organisation**, study undertaken for the Schulbauinstitut der Länder, mimeographed, Berlin, 1972.

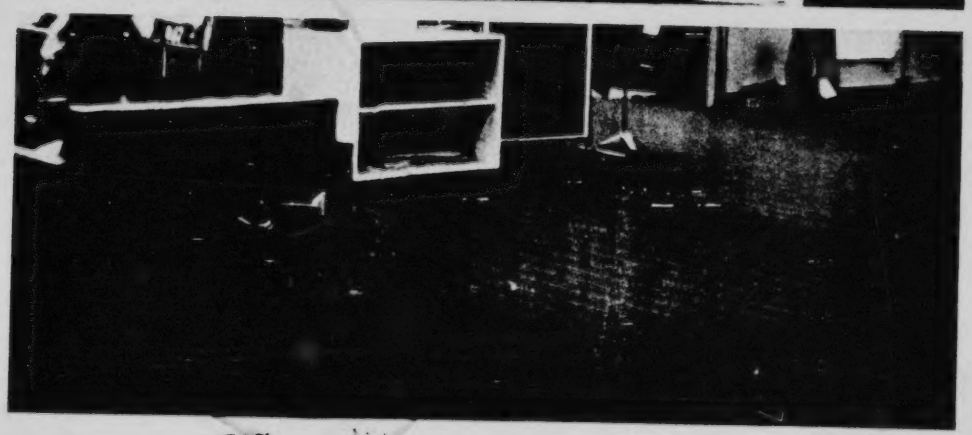




3. Social base in the Arts and Craft Centre at Henry Fanshawe School, Dronfield (England).

4. An unexpected social base: the elephant built by the pupils is hollow; it serves as a retreat endowing the corner of the area in which it is situated with special value—the textile area of Gröndalsskolan, Värnamo (Sweden).





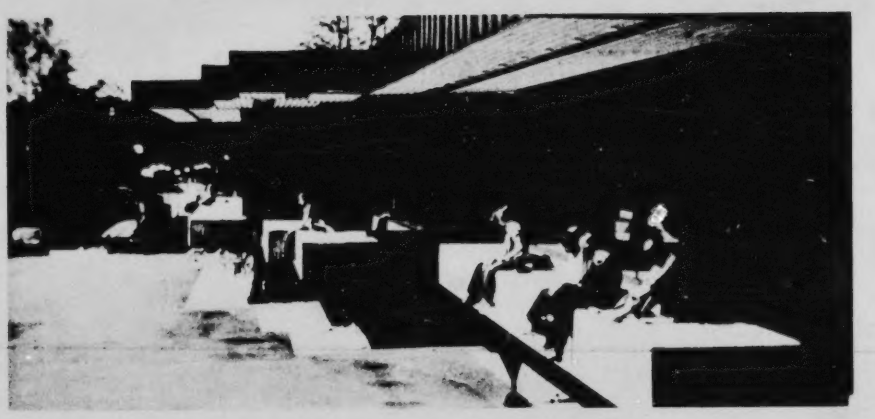
5. Henry Fanshawe School: social life during work.

6. The lone wolf on a desert of carpeting: a SEF school, Toronto (Canada).

Social life outdoors.

7. Värnamo upper secondary school (Sweden).

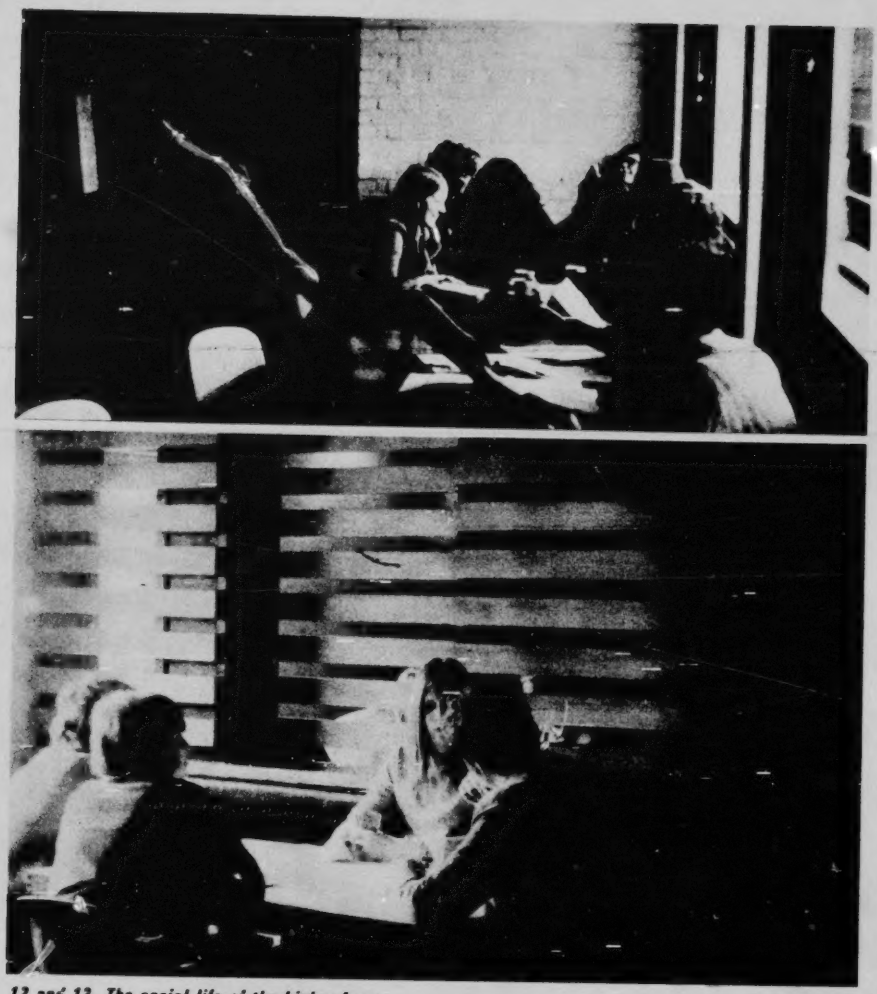
8. Henry Harland School, Nottinghamshire (England).



9. As a comparison, this photo shows the image which two young Swedes have of school...

10. The entrance to the same school in Detroit: it takes more than a bold decor and large spaces to create valid facilities for social life.

11. A school in Detroit (United States): this space is the scene of all kinds of social activities, including the buying and selling of drugs.



12 and 13. The social life of the higher forms at Rowlinson School, Sheffield (England).

sometimes under the illusion — or act as if they were under the illusion — that the social life of this society of young people begins when they are assembled in school. They attach a no doubt excessive importance to finding the best possible social organisation and act in the light of what the social life of school children ought to be much more than of what it really is.

60. This distortion is obviously repeated in the design and use of buildings. Thus, in some schools in Detroit, the real centre of social life is the lavatories, as the scene of fringe and clandestine activities. While this extreme case must not be over-emphasised, it is not unusual to find in the new schools that the places provided for social life are deserted, while the real social life, exchanges, free discussion or games, go on in the corridors, in odd corners or in open spaces. There are often two main reasons for this; first that the designation of these places is institutionalised by the authorities, and, secondly, that these places lie on the edges of the real stream of life. This tension raises a number of questions affecting the design of facilities, among which we can mention only a few:

— Can the design of new schools profess to organise this social life in advance, or is it enough to provide the necessary space for it to develop under its own impetus ?
— Should the facilities designed to encourage social life be combined with working areas or not ? Or should areas for social life and work be designed separately ?
— More generally should facilities be provided exclusively for social activities ? Or should provision be made for the interpenetration of social life with all the diverse activities of school life, by giving all facilities a character conducive to the development of a rich social life ?

V. Conclusion

61. Having made the above analyses, the meaning of the term « implications » in the title of this study can now be specified. As has been seen, the logical sense of the word should be discarded. The reason why the building implications are not the mere logical outcome of an educational concept of school is because the work of the architect is already implicit in the formulation of this concept. The facilities are not neutral in relation to the tensions which develop within them.

62. The most useful models for determining the facilities would therefore appear to be models of functioning which integrate the tensions characteristic of the multi-option school. The weakness of most known models is that they foster the illusion that the new school provides a solution to social problems, whereas in fact the tensions described are rooted in the reality of society; they have deep-seated causes that cannot be dealt with simply by good educational practice. The model needed by design teams must take this into account; it must not come down simply to a set of principles, but instead must form a framework making it possible to identify or recognise at all levels the repercussions of the fundamental tensions of educational reality.

Part three:

THE PROBLEMS OF BRIEFING AND DESIGN

30

63. The object of Part Three is to identify, define and elucidate the problems, both practical and theoretical, which arise in the operational phase of working out school building projects. This phase corresponds to the work which is known in some countries as « planning ». It includes both the programming of facilities and the projection (or interpretation) of this programming into outline plans or preliminary designs (1). Without going into detail, it may be said to consist of:

— defining and characterising the types of areas and facilities needed by the multi-option school; the term « facilities » therefore no longer has the broad general meaning we have so far given it, and must be precisely defined, according to different categories;
— determining the capacity of these areas and facilities; this is a work of quantification, the purpose of which is to measure as precisely as possible the expected potential of the facilities to be provided;
— establishing a network of relations between these areas and facilities; these relations are necessarily spatial (proximity or distance, separation or integration, inter-communication or isolation, etc.) but their significance or their raison d'être transcends these purely spatial relations.

This work can be done at two distinct levels:

— the elaboration of a type of school, if not at central then at least at regional level, which can be reproduced and meets a sufficiently large demand to justify substantial investment in time and studies;
— the working out of precise proposals for the construction of an individual school.

64. From the point of view which concerns us here, namely that of the methodological approach, it seems possible to minimise the differences between these two levels. In fact, while it might logically have been expected that work at the second level would stem from work at the first, it is often found in practice that the relation between the two levels is purely secondary and becomes established after the event when a particular project, breaking away from dominant habits and ideas, mobilises enough creative effort to make it worth adopting at a higher level with a view to generalisation.

I. What is the point of departure for briefing and design ?

65. The first question is whether the « tension model » we have tried to outline in Part Two can be used as a basis for this work of elaboration. The answer would be affirmative if we could limit ourselves to a deductive description of the work in the briefing and design stages. But we have seen that the apparent continuity between models and their use in fact covered a series of choices and inventive proposals as well as hazards or circumstantial decisions to which logic never provides the key. It is also quite clear that the tensions of which we have spoken, in so far as they define a relation of a dialectic nature, cannot provide a sufficiently firm foundation or give a sufficiently operational basis from which to derive the working out of a type of building.

66. Finally, even if these tensions are expressed — and experienced — in a specific way within an educational system and therefore in the reality of the life of a school, they do not originate from that reality or from that system. While they are educational in their manifestation, they are in fact rooted in the social, economic and more largely political system of which the educational system forms part (2). They cannot therefore act as a principle on which the search for and the determination of the appropriate facilities can be based. They operate more as criteria for assessing whether a school, or a design for a school, makes it possible or not, or makes it more or less possible, to live with the conflicts in question. In this sense, what is expected of a school (or more accurately, of a type of school facilities) is not that it encourages the elimination of tensions or the resolution of conflicts, but that it helps achieve a lucid mastery of their evolution. This means that the concrete educational solutions, to which those responsible for school building make their own contribution, must never be allowed to mask these conflicts and, similarly, that they must never satisfy at the expense of the other one of the requirements which are the poles of these tensions (common education against freedom of choice, individualisation of work against socialisation of school life and so forth), and finally, that they must make it possible to try out new ways of coping with these tensions or with any new ones which the future may disclose.

67. For all these reasons we are led to look for a middle term or intermediate term by which we can progress from this multi-dimensional and dynamic representation of school life to briefing and then to the elaboration of conceptual diagrams directly usable for the building of schools. It should be sufficiently stable and fixed to afford a sound starting point for the

1) No consideration will be given to the breakdown of this work into successive phases, since this Part is confined to the problematics of this work. Questions relating to the responsibilities involved will be considered in the last part of the report.
2) Paragraphs 61 and 62.

difficult and patient work of converting educational concepts and expectations into precise analytical prescriptions. In the short history of school building (1) it is possible to identify the main starting points, or points of support from which the procedures for formulating briefs and conceptual diagrams have developed.

A. The Class Group as the Point of Departure for the Brief

68. For a long time the traditional starting point was the educational organisation of the school, and more particularly, organisation by class group. All the pupils were split up by age groups and each age group was divided into classes of 30 to 35 pupils, forming the basic units of organisation, in the sense that each class was organised as an indivisible entity, occupying, for example, during each school period, the same room under the supervision of the same teacher. From all that has been said above (2) it is clear that the design and functioning of the multi-option school is in sharp contrast with these characteristics. A brief on this basis was in fact mainly used for forms of education which existed long before the appearance of the multi-option school. The development of this type of school means that such a brief is open to the following objections:

a) Some well-known criticisms of this type of educational organisation would in fact have been better levelled against the type of briefs which gave it dominance:
   — since each class group has the sole use of its own classroom, it is constrained to spend most of its time there with a view to getting the best return out of the allotted space. Educational possibilities are limited by the form of the brief, which adds up classrooms of identical size and function;
   — at secondary level these basic classroom units must be supplemented by specialised facilities used in turn by the different classes, such as science laboratories, art studios or music rooms, workshops and even an audio-visual room or library. The more numerous the « common services » of these class groups', the more they result, on account of the organisation, in an under-utilisation of the available space. Each class group using these specialised facilities necessarily leaves its own classroom (of which, generally it has exclusive occupation) vacant.

These buildings have rightly been criticised as being poor and monotonous in terms of the educational possibilities they offer, at the same time they are relatively costly if one considers the cost performance ratio (3) of this type of construction.

b) Other shortcomings may be noted if one refers to the tensions characteristic of the life of a multi-option school (4). While they cannot be considered here one by one, it can be said that a brief based on the overriding importance of the classroom does not help to take on these tensions:
   — the classroom was generally given credit for encouraging socialisation based on the stability of the group and the appropriation by the group of a permanent home where each individual had his place and where nearly all its activities took place. Now, we have already shown in paragraphs 56 and 57 that socialisation was not necessarily linked to the appropriation of space and the feeling of security it confers. Neither does this formula allow a genuine individualisation of school work. The uniform and monolithic group imposes its own order upon it without the real dimension of social life being able to reveal itself, in the very experience of individual work, as a fundamental need;
   — it could similarly be shown that this type of organisation encourages the development of a common core of education at the expense of the practice of a free choice of options. In fact optional activities break up the groups and scatter them outside their familiar surroundings; in a teaching organisation based on the exclusive appropriation of space they would therefore be felt to be a sort of exile or evasion and would thus lose their true significance.

69. There is no point in prolonging this criticism to arrive at the conclusion that it is impossible, according to the criteria we have defined, to install a multi-option school in buildings in which the planned layouts result from an organisation by class group. In the multi-option school the class has usually disappeared. Sometimes it survives in the form of an administrative unit, as for example in Sweden, where the official definition of the Basic School (higher level) corresponds fairly closely to the characteristics of a multi-option school. But this unit does not constitute a basis for organisation and cannot be used as a point of departure for briefing.

B. Subject Areas as the Point of Departure for the Brief

70. As opposed to the above form of brief the structure of the curriculum has been taken as point of departure, that is to say all the subject areas which together make up school life (as distinct from disciplines which refer too exclusively to intellectual work). The design of a school primarily based on the subject areas making up the curriculum leads to a solution of a type equally wellknown: the arrangement by department or the departmentalisation of the building. A fairly simple and complete idea of the school can be obtained by assuming that each subject area in the curriculum has its own « quarters » providing the appropriate facilities for the relevant work. Starting from this first principle, this procedure follows two complementary directions, one defining the internal layout of each of the « quarters » and the other defining the relations of proximity or communication between the different « quarters ». Each of the « quarters » or departments is also defined by what it comprises. The quantification of this consists in fixing the number of places which each offers, i.e. the maximum number of pupils who should be able to work there at the same time. This calculation is very simple in principle; the capacity of a department, in this briefing method, depends solely on three factors generally regarded as given: the number (n) of pupils in the school, the importance attached to the relevant subject area in the curriculum, generally measured by the number (H) of periods per week (5) and the time during which the facilities are available, D, which is best expressed in the same unit as the foregoing parameter (6).

71. The number of places needed in a department is given by the formula $\frac{H \times n}{D}$, which means that, on the principle of full utilisation, the capacity of a department is proportionate to the relative importance of the relevant subject area in the curriculum and inversely proportionate to the time during which the facilities are available. The refined calculation is a little more complex since a school in practice comprises a number of grades

1) Not, of course, that school buildings themselves are anything new, but that it is only in recent years that school building is the outcome of specific research or specific methods.
2) Paragraphs 30 (a), 41 and 42.
3) This is the ratio between on the one hand the quantity of space and its cost and on the other the service effectively rendered by the facilities.
4) Paragraphs 37 to 60.
5) On the length of periods, see paragraph 31 (b).
6) It is well known that there is a wide margin between the theoretical and the actual time of availability of facilities; actual availability, which depends greatly on socio-economic factors external to the school, is generally 35 to 40 periods of 40 minutes per week. But the situation may vary from one country to another. In Germany, for example, the full day use of schools is just beginning.

TABLE 5:

Method of calculating the areas required for an intermediate school (Junior High School) with an enrolment of 878 pupils in accordance with the theoretical programme of SEF

Subject	Grade 7	Grade 8	Grade 9	Total periods	Number of teachers	Number of areas
	Period x class	Period x class	Period x class			
English	12 x 9 = 108	12 x 9 = 108	7 x 9 = 63	279	8.0	5.8
Mathematics	6 x 9 = 54	6 x 9 = 54	6 x 9 = 54	162	4.7	3.2
History	4 x 9 = 36	4 x 9 = 36	4 x 9 = 36	108	3.2	2.2
Geography	4 x 9 = 36	4 x 9 = 36	4 x 9 = 36	108	3.2	2.2
Science	4 x 9 = 36	4 x 9 = 36	6 x 9 = 54	126	3.7	2.5
French	4 x 9 = 36	4 x 9 = 36	6 x 9 = 54	126	3.7	2.5
Art	3 x 9 = 27	3 x 9 = 27	5 x 4 = 20	74	2.2	2.0
Music	3 x 9 = 27	3 x 9 = 27	5 x 5 = 25	79	2.4	2.0
Industrial arts or	3 x 9 = 27	3 x 9 = 27	5 x 4 = 20	74	2.2	2.0
Home economics	3 x 9 = 27	3 x 9 = 27	5 x 4 = 20	74	2.2	2.0
Typewriting	—	—	5 x 5 = 25	25	0.8	1.0
Group guidance	1 x 9 = 9	1 x 9 = 9	1 x 9 = 9	27	0.8	0.5
Physical education	3 x 9 = 27	3 x 9 = 27	3 x 9 = 27	81	2.4	2.0
Health education	1 x 9 = 9	1 x 9 = 9	1 x 9 = 9	27	0.8	0.5
Lunch	6 x 9	6 x 9	6 x 9	12	—	1.0

Source : SEF E2, op. cit., page 40.

Note : This table is used only as a calculation base to determine areas required. It must not be interpreted as a curriculum recommended by SEF.

or age groups for whom the proportion of the timetable allotted to the various subject areas varies. The formula then becomes:

$$\frac{(H_1 \times n_1) + (H_2 \times n_2) + (H_3 \times n_3) + \ldots}{D}$$

where H_1, H_2, H_3 are the number of periods assigned to the subject area in the years 1, 2, 3 etc., and n_1, n_2, n_3 the numbers of pupils in the same years.

72. Finally, two types of adjustments must be made to these results:

— the first are to allow a certain flexibility in timetabling; it is generally agreed that it is impossible in practice to make do with a theoretical number of places. But estimates of the supplementary margin vary widely from one case to another, from one country to another, and even from one architect to another (from 15 to 33 per cent in the cases observed);

— the second introduce, where necessary, a reference to the size of the groups which may constitute the basic teaching units; in this case, it is appropriate that the number of places on which to base the capacity of the departments is a multiple of the number of pupils in the basic teaching unit (a multiple of 30 in the traditional school).

73. This apparently rigorous procedure which seems to ensure a rational adjustment between school activity, as defined by the subject areas of the curriculum, and the facilities provided, has certain limitations and, in the case of the multi-option school, leads to certain deadlocks which must now be considered.

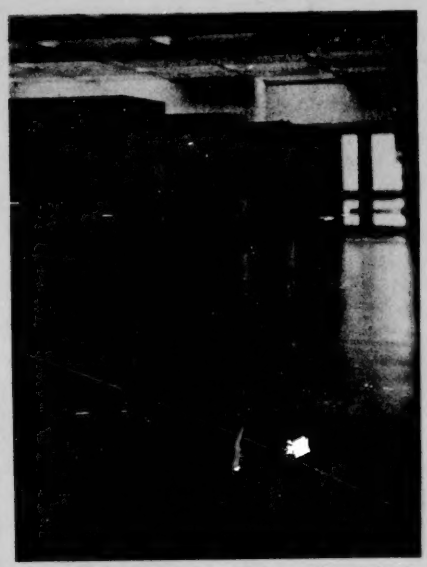
a) The ambiguity of the accounting; the use of a simple and strict mode of calculation makes it possible to quantify needs so as to ensure a rational use of resources, despite abandoning the habitual unit of account, the classroom. Many countries have used a procedure of this kind to define school building norms. In fact, this guarantee is no doubt illusory, since the calculation, strict in itself, is applied to an imprecise field, which is hard to pin down:
   — the idea of place (which, moreover, varies according to departments) is defined in nature and quantity by reference much more to usage than to rational studies;
   — the margins of adjustment (flexible use requires additional places) generally have no scientific value; their rate is the outcome of a trial of strength between potential users or architects and those who put up the money;
   — finally, there is no good way of applying these modes of calculation to forecasts in the case of a system of options. In fact, even if probabilities of the distribution of choices among the different specialities offered (1) are established through observation of educational practice, which is not generally the case, it would still be quite impossible to apply this calculation to the distribution of places needed for freely chosen work, unless the range of free choice activities were predetermined, which seems a contradiction in terms (2).

b) This procedure confounds two realities which are different in kind: the subject (or discipline) and the space assigned to it. This means that it postulates the definition of a space by reference to the subject which is made to correspond to it, and the distinction between spaces assigned

1) i.e. probabilities as to the additional capacity of each department corresponding to an option of type (a) or (b). See paragraph 19.

2) In practice, since the norms correspond to a strict application of the time periods scheduled in the curriculum, one often arrives at the paradox of inflexibility of use associated with a high standard of equipment.

to different subjects. This overall specification of departments leads to an educational impoverishment, each subject being linked with a dominant type of learning; the possibilities of experimenting are concentrated in the science block, the possibilities of creative activity are confined to the workshops and studios, while history and geography are cut down to purely intellectual activities, benefiting solely from specialised documentation, and so forth. Each subject therefore has only a narrow range of possibilities.



14. Central cloakroom at Pleasant View School SEF, Toronto (Canada).

c) It is hard for this type of briefing to get to grips with the problems of social life, which cannot be ranked as a subject area and which is therefore difficult to integrate in this type of organisation. Even where one or several areas are allotted to social life, such social life is sacrificed to the principle of organisation by departments; it is common knowledge that the most acute problems in schools conceived in this way are the excessive frequency of movement from one place to another, and the sometimes monstrous importance of entrance areas (central cloakroom) which, as well as taking up a lot of room, lead to massive concentrations of pupils with unfortunate results such as problems of discipline, fringe or clandestine activities, pilfering, so that while remaining an incumbrance, the cloakrooms, often become useless, many pupils preferring to lug their belongings around in the specialised premises.

d) This procedure is open to further criticism in relation to the tensions which characterise the multi-option school:
   — based as it is on the specialisation of subjects and accommodation, this type of organisation is not a good answer to the problems of in other words, between the different subjects, whose autonomy it encourages;
   — similarly, departmentalisation inter-disciplinarity. Since it starts by separating accommodation — and often isolating it as frequently happens with workshops which are deemed to be noisy or to cause a nuisance — it is hard to establish functional relations between items of accommodation or means a reduction in the number of different types or styles of learning which can be practised in a given place [see point (b) above]. It is practically impossible, for example, to make a model in the history or geography (or social sciences) department and therefore to propose to certain pupils a way of learning which might suit them better than verbal — conceptual activities. This type of organisation therefore minimises the possibilities of differentiating teaching, in favour of a common treatment imposed by the exclusive specialisation of facilities.

74. It must, however, be noted that this form of brief constituted such progress in the approach to the problems of facility provision that it is still retained in many cases and still influences buildings the innovatory character of which cannot be doubted. Example: Henry Fanshawe school at Dronfield has been restructured by the addition of a large block grouping three departments: science, crafts (metal, wood, home economics and textiles) and arts. But the evolution of the principle of departmentalisation is obvious there:
   — Each department has been the subject of internal analysis which at the same time distinguishes and connects different activities; in the part allocated to science an information and demonstration room is separate from the laboratory zone, the continuity of which does not preclude its division into sub-zones capable of specialisation. The same approach has been adopted for the project zone common to the studios in the arts department;
   — the three departments are integrated in the same large block, the design of which is based on a study of the relations between the zones of complementary or similar activities of the departments. Although relations with the departments located in the old buildings suffer from excessive distance, the new block can accommodate groups working on other subjects (see the meeting zone of the science department).

75. Despite the improvements made to the formula, the principle of departmentalisation provides only a very rough instrument for briefing. The concept of subject areas on which it is based — which by reason of the conceptual approach to knowledge, and therefore of the curriculum from which it proceeds tends to be self-sufficient — is too wide to take account of the real life of a school and therefore to lead to the provision of the facilities needed. It also implies a compartmentation of knowledge, and therefore of studies, which is not pertinent to analysis of the needs of an education which gives growing place to integration (1). If reference to subjects is still essential today, it is because it corresponds to the reality of the structure of the curriculum and the specialisation of teachers. But it becomes operative only when it breaks out of this framework and allows an analysis of the activities to which the subjects in fact give rise.

C. Activities as the Point of Departure for the Brief

76. Reference to activities often seems to be a refinement on reference to subject areas. It is in fact very soon found that the definition of accommodation for geography or humanities, or facilities for science teaching, which seems at first sight to be self-evident (2) proves insufficient or, in a sense, arbitrary as soon as projects try to break away from sheer habit. In reality the terms « premises for geography » or « mathematics area » are inoperative. There is a need for specification indicating that an area is insulated, soundproof or able to be blacked out, etc. The idea of activity was the first which seemed capable of providing a bridge between these two levels of specification. Activity, in this sense, is internal to the subjects which continue to constitute the frame of reference but must be analysed: what are the types of activities involved in the various subjects ? It is the answer to this question which enables us to specify the types of facilities needed.

77. Examples:

a) **Theoretical example** (fictitious simulation): analysis of needs for foreign language teaching. Take a school of 800 pupils where this teaching occupies 5 periods per week (units) for each pupil.

1) Paragraph 49.
2) Or based on the unchallenged advice of specialists, which comes to the same thing.

The total needs are 800 × 5 = 4,000 pupil-units. If the groups formed are of 160 (a whole year), of 32 (a heterogeneous basic group) or of 16 pupils (a half-group), the theoretical needs are;
— 25 units/group in groups of 160
— or 125 units/group in groups of 32
— or 250 units/group in groups of 16.

The starting point is the amount of time allotted in the timetable to each subject area (common core plus options) leading to the determination of the number of places and the space requirements according to six different types of working place. We give, by way of example, the distribution of activities in a subject area

Types of activities to be taken into account in this teaching.

Activity	Percentage of total time	Size of group	Needs in units/group	
			gross	adjusted (1)
1. General presentation, information in large group	10	160	2.50	3.1
2. Individual study with resources	25	160	6.25	9.0
3. Group audiovisual	15	32	18.75	25.0
4. Individual audiovisual	15	16	36.75	69.0
5. Conversation, role-playing	15	16	36.75	83.0
6. Recapitulation, revision	20	32	25.00	32.0

This type of analysis, which there is no point in giving in full detail, leads to the designation of types of accommodation and their rate of utilisation (2) for the relevant activity. Thus, activity 1 needs a room for a large group, but will only use it, at the most, less than 10 per cent of the time (if the accommodation is available for 40 periods per week).

Activity 4 needs two rooms for small groups, which will be used 100 per cent. By applying this analysis to all subject areas we arrive at a definition of the quantity and quality of all the facilities needed. An interesting point is that similar activities are found in various subjects and can thus be grouped in the same accommodation; this allows a full use of facilities which the needs of a single subject area would not justify — for instance, in the present example, the information room for large groups.

b) **Real example**: SAMSKAP has developed procedures of the same kind, but the calculation — which was, moreover, slightly different from and less formal than our simulated example — was mainly designed to arrive at new solutions without increasing the areas and costs prescribed by regulation. Apart from analysis by subject areas, the study of the activities they involve led to the inclusion of new facilities in its building programmes: information room, room for role-playing, mediathèque (special type of library — resource centre or multi-media centre).

c) **Real example**: In its booklet, *Secondary Brief*, the Lancashire Education Authority describes the method of calculation used in briefing for new schools. such as the one regrouping history, geography and religious education (humanities):
— teaching in « traditional » groups of approximately 30 pupils (15 %);
— writing, practical project work in variable size groups (80 %);
— teaching in large groups of about 120 pupils, e.g. for introductory lesson or film (5 %).

78. Critical comments:

a) The calculation procedures formalised above are open to the same kind of criticism as those levelled against departmentalisation (3): the calculation is rigidly applied to arguable concepts or intuitions; the estimates do not specify their degree of approximation, and the results of observation are mixed up with what is deemed desirable. If this kind of instrument has retained any real value in the elaboration of projects it can be attributed not so much to its mathematical rigour as to its value as a basis of discussion between architects, educationists and administrators; it helps to bring home the need for choices, to clarify them and to assess their possible consequences; it can, for example, be shown in this way that dropping one type of facility from a project leads, among other things, to increasing the capacity of the other types.

b) Experience shows that schools designed according to this procedure raise problems less acute than, but of the same type as, those involved in departmentalisation as regards the social life of pupils: vagrancy and errantry, feeling of anonymity and insecurity arising mainly out of the difficulty of integrating social life in school activities as a whole. It is, in effect, regarded as a particular activity and the logical tendency is to provide specific and distinct facilities for it. But the real social life develops away from such facilities in the corridors or marginal zones (4).

c) It may also be asked whether the identification involved in this procedure between the activity and the accommodation assigned to it makes it possible to identify the real problems of providing facilities adapted to the life of the school. It is not always easy in practice rigorously to plan activities and the occupation of the accommodation corresponding to these activities; both teachers and pupils often resist this new type of specialisation; when the need for an information session arises in the course of a group activity, they are not necessarily willing to move to the accommodation most suited for this session. Furthermore, by a sort of paradox, this identification demands a fairly global approach to the activity; to speak of laboratory work or library work implies that these activities are somewhat complicated and cannot be broken down, and that the laboratory and the library each form a whole. But is it the laboratory as it is which defines the activity, or should it not be the activity which defines the laboratory it needs ? On this latter assumption, it would no doubt be necessary to move to a finer level of analysis to find out exactly what activities (or sub-activities) are included in the activity designated by reference to the accommodation in which it takes place. In the absence of such an analysis, there is a danger of confining the brief to reference to accommodation types, either because they are part of familiar and standardised schedules or because they appear as ready-made products of fashionable innovations. This difficulty is not merely theoretical: in the absence of a solution, a great many projects borrow, either from tradition or from appealing examples, facilities which they confine themselves to imitating. It is then found that it is not too clearly known how to use this often costly instrument (the resource centre, the open plan, or even the language laboratory with a level of performance well above that demanded by the real needs). Another example of this was illustrated by the uncertainties of the principal of a new school and his staff facing the problem of equipping a large resource centre (more than 400 m2), the vital centre — still empty — of the school; no one really knew how to arrange this area, the need for which, however, no one doubted.

1) After adding margins for flexibility of functioning and needs due to options calculated on the estimates of probability of choice (cf. paragraphs 72 and 73 (a).
2) Allowing for the margins adopted in the calculations.
3) Paragraph 73.
4) Paragraph 59.

d) It must, however, be emphasised that schools designed on the basis of activities derived from the subjects in the curriculum afford great possibilities for the multi-option school. In particular, they make it possible to take on most of the tensions (1) whose importance we have noted. In practice, the brief of this type of school is based on the assumption that activities matter more than subjects and that the different subjects, while retaining their specific character, allow common activities; the result is an interesting approach to the problems of interdisciplinarity. In the same way, laying stress on activities makes it easier to conceive a project which combines common education and differentiation, since differentiation essentially presupposes variation of groups and variation of activities within disciplines.

79. It follows from all these comments that the idea of activities is a key idea for the process of briefing adapted as closely as possible to the needs of a multi-option system. But there are two reasons for the inadequacies of solutions which derive from the elementary approach of this notion:

— first, it is not realised that the notion of activity is not enough in itself, that it has no unequivocal objective reality, and that it makes sense only in a multi-dimensional educational context;
— secondly, it is difficult to find the optimum level for the analysis of activities: if too fine, it would no longer correspond to the dynamic and complex character of school situations; if too general, it affords no certainty in coming down to the precise determination of facilities.

II. A multi-dimensional analysis of briefing and design

80. The foregoing analyses seem to indicate that:

— it is when they give preference to one single principle, or a simplified point of departure, that briefing procedures arrive at results which are not very satisfactory. The logical course would therefore be to look for new procedures combining references to the various fundamental principles previously outlined: activities, subject areas and class group;
— the idea of activity (2) seems more pertinent than any other in accounting for the whole wealth and complexity of the educational concept behind the multi-option school. But even so, it comes in not only as an instrument of analysis, but also as a subject of analysis. The reality of the functioning of a school cannot be really grasped by listing the activities which constitute such reality, if it is not at the same time made clear what these activities are;
— the quantification of facilities appears to be not only a procedure allowing adjustment between needs and resources, but also an essential step in the design of facilities, insofar as it makes it necessary to specify and define what is to be quantified. This obviously assumes its full importance where it is not so much a question of resorting to familiar types of facility as of inventing or proposing new types.

81. The results of the foregoing analyses can be integrated in a set of proposals, presented below, to make the work of briefing and design richer and more complete. It may be recalled that the objectives of this work are to arrive at the greatest possible mastery of the relations between the facilities to be provided and the use expected of them (3) The mastery of this relationship is today an educational requirement — as Part Two tries to show — but also an economic requirement (the optimum use of available resources).

A. The Complexity of Activities

82. If it is accepted that the expected use of facilities can be expressed in terms of activities, it remains necessary to arrive at a better understanding of what is included under this generic term; this concept has, in effect, no explanatory value unless it is itself in turn explained, or at least analysed.

The first dimension of the analysis: observable activities, desirable activities, possible activities

83. Observable activities are the real activities which can be observed in educational practice and the real life of schools; desirable activities are those which form part of the educational concept which precedes the brief; possible activities are those which the facilities in fact allow to be carried out. While these distinctions are of no great interest in themselves, they nonetheless help us to identify important relationships. In practice, desirable activities are never defined from scratch but usually from a critical examination of educational practice in which elements of innovation can be discerned. Furthermore, the possible is defined by the tension between what is desired and the identified constraints. It should be noted in this connection that the constraints do not all concern the building or its envisaged equipment, but also the circumstances under which the school is to be built; these include, for example, the availability and qualifications of the teachers and their ability to adapt. But the possible must not be conceived solely as an impoverishment of the desirable; experience in fact shows that facilities are capable of accommodating activities which had not been foreseen. One example is the modular furniture of the SEF schools in Toronto: in permitting transformations decided upon and carried out by the pupils and their teachers, this furniture has revealed possibilities beyond those foreseen in the functional study from which this furniture first originated.

84. The team of teachers of the Collège de Sainte-Maure-de-Touraine (France) was distinguished by a particularly keen consciousness of these tensions between real, desirable and possible activities. As has been seen this team is developing a very innovative teaching in a building of traditional design (4). Its practice is directed towards both an individualisation of work and an enrichment of social life by the school co-operative. In their lucid reflections on their experience, the teachers emphasise that the essential activities for their work are generally those which are in fact the least developed (e.g. the use of documentation). They attach paramount priority to them, but the facilities available afford them scant possibilities.

The second dimension of the analysis: characteristics of activities

85. For the purpose of characterising activities, it seems necessary and convenient to describe them in terms of behaviour. Nevertheless, taking account of the use of the notion of activity in the field of school building, this description proves disappointing. Activities assume their real significance only when related to school situations. It is thus seen that they must also be characterised by:

— their integration in the educational organisation; in particular, the size of the groups engaged in the activity at any given moment is an important characteristic. Is role-playing as part of the work of a small group, for example in the learning of languages, the same activity as self-expression by role-playing before a group of some hundred pupils ? Can it have the same implications for facilities ?
— their reference to the subjects with which they deal; every activity has a

1) Except, in any event, for those affecting social life (see point (b) above).
2) This term has so far been used in its everyday meaning; from hereon it is used in a technical sense.
3) This expected use corresponds to the term already used: what happens or should happen in the facilities provided.
4) Paragraph 38.

Diversity of activities and workplaces

15. Group discussion, Rowlinson School, Sheffield (England).

16. Handicrafts, Örtagårdsskolan, Malmö (Sweden).

17. Independent work, Pleasant View School SEF, Toronto (Canada).

18. Independent work, Rowlinson School, Sheffield (England).

content, objectives, a value (1), a frequency and a duration which depend on its place in the curriculum, if this term is interpreted, according to now established practice, to mean the whole of the contents and the methods by which they are implemented. In this sense, closer study should be given to the question of how far certain activities can be common to various subjects (2) or, conversely, of how far they must be specified by subject. In many instances this question can be settled only by an enlightened judgement.

The third dimension of the analysis: fields of activities

86. It often happens that the analysis is confined to activities connected with school work. For a long time, standardised school building briefs in most countries took little account, in prescribing facilities, of anything except activities induced by the curriculum. To these they added the inevitable accompanying activities, called ancillary, such as taking lunch and relaxing between classes, etc. But account must quite obviously be taken of activities connected with the social life and leisure of the pupils, the importance of which and the difficult problems they raise in the design of facilities have already been noted (3). The need is becoming increasingly apparent

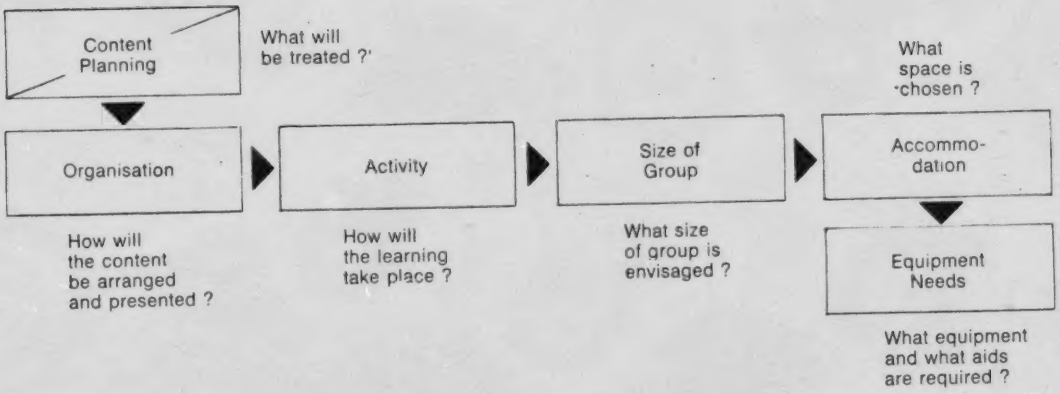
1) Value indicates the importance of an activity in relation to all activities deployed for a given subject.
2) Paragraph 77.
3) Paragraphs 54 and 55.

3782

The LINS Project

This project was first put into operation in Malmö, Sweden, with the support of the central authorities concerned. It aims at developing efficient methods of determining the equipment and aids needed for the Basic School. Each phase of the education process as indicated in the official curriculum guidelines of the Swedish Basic School *(Läroplan - Lgr* 69) can be described in the form of school situations characterised by a dominant educational objective, the size of the groups concerned and the activities to which it gives rise. It is in the light of these activities that the teachers, in dialogue with the experts, indicate the type of accommodation occupied, the equipment used and various details concerning it. By consolidating the records drawn up as a result of this dialogue, for a sample of situations, the equipment needed for the school can be derived and ways and means of rationalising it proposed. As far as is known this procedure has never been used as a basis for briefing and design of school buildings. On several occasions, however, although this was not its real purpose, it has been used to test projects at the plan stage with a view to proposing amendements, even though the method is still somewhat empirical and leads to only fragmentary results in this application. It is nevertheless thought that it points to an interesting line of methodological research.

Diagrammatic Presentation of the Steps Followed


Content Planning
What will be treated ?'
What space is chosen ?
Organisation
Activity
Size of Group
Accommo-dation
How will the content be arranged and presented ?
How will the learning take place ?
What size of group is envisaged ?
Equipment Needs
What equipment and what aids are required ?

List of Activities Used

Receptive activities
Listen
Observe
Read

Reciprocal activities
Discuss, converse
Question, answer

Study activities
Make notes
Write, calculate
Look up in books, practise study techniques
Work with diagrams, work sheets
Work with wall maps, blackboard, etc.
Practise phonetics and pronunciation
Work with audio-visual aids
Memorize
Carry out experiments

Creative activities
Act, dance
Sing
Play instruments
Write (e.g. essays)
Model, practise handicrafts
Draw, paint
Construct

Reporting activities
Relate
Present, demonstrate
Act
Sing, play
Undergo written examination
Undergo oral examination

Irrelevant activities unrelated to the curriculum
Wait
Discuss matters outside school work
Scrap with classmates
Play
Disturb, sabotage work of others

to take into account the use of school buildings by the adult population of the community and therefore to include in the analysis activities connected with the community use of facilities. Finally, two other fields, too often forgotten, should be the subject of analysis.

— The logistic activities which enable the essential activities to run smoothly: this is a wider field than that of the « accompanying activities » referred to above; it includes, for example, the material production and reproduction of documents and the storage and maintenance of equipment, but also administrative activities, the subordinate character of which is not generally evident to those responsible for building.

— Irrelevant activities (1) — or marginal or atypical activites — which it is useful to identify in advance to try to prevent them. Theft and the deterioration of equipment create serious problems for schools using advanced technology.

B. The Analysis should lead to a Typology of Foreseeable Activities

87. This typology would take the form of an ordered description of activities which would be made up by means of a simulation of the daily life of the school. An idea of what could be done is given by the way in which the LINS project (already frequently referred to) operates.

88. In this simulation, the activities would emerge characterised in nature, frequency and value (thus making it possible to introduce priorities which will enter into subsequent choices). This simulation cannot be improvised. It obviously depends on the educational models already referred to, but, as has been shown (2), it cannot be inferred from them by pure logic. The model of functioning characterised by tensions integrates particular models which serve as an intermediary and come into play between the model and the result which constitutes this typoiogy of activities. They could be called operational models or models of educational procedure. A few real examples will illustrate this suggestion:

a) Procedure recommended in the Swedish Basic School for work in what are called « orientation » subjects (history, geography, physics, biology, etc.) of the present common curriculum *(Lgr 69)*: the content — which often includes elements drawn from several disciplines — is divided into units of work; these serve as the basis for the work of a group of pupils of the same year for a period usually of three to four weeks. The work is planned and carried out by a team of teachers in a group of 90 pupils. The work sequences are as follows: introduction (generally for the whole group); study of a common core of knowledge, followed by study in depth of certain aspects, according to the interest of pupils; the results of this last phase of work may often be fed back to the large group and knowledge of the common core is then tested. The open space with areas for individual work and work in small groups and the resource centre, surrounded by a few smaller enclosed spaces, as found in the SAMSKAP schools, have been designed to this model.

b) The units used in the Nordrhein-Westfalen *Gesamtschulen* constitute a model of a similar, though different, type. They are spread over several weeks (four to six) and result in the pupils being split up into groups differentiated according to their assimilation of preliminary general information; each group and subgroup has its own objectives (3) within a common programme. This model was the direct inspiration of the large rooms of the Fröndenberg *Gesamtschule* which have often been referred to.

c) At Sainte-Maure-de-Touraine (France) the method currently practiced in several subjects also follows a sequential model; a collective phase is followed by a personalised phase of work (assimilation and production), followed again by what is called a « socialisation » phase of feedback of this work to the group. This model has, for example, made it possible to arrange a traditional type classroom as a foreign languages room where differentiated corners have been created and equipped (4). The teachers at this school have also been able to work out coherent proposals which might perhaps be used in a future extension of the school.

89. It is easy to see that models of this kind can, on the one hand, be interpreted as ways and means of taking on the tensions of the multi-option school and, on the other hand, make it possible to simulate the activities of a school of this type. The advantage of this kind of simulation is that it embraces no longer isolated activities, but sequences of activities. Care must, however, be taken not to confine the simulation of activities to the use of the model of educational procedure, since this is not enough to account for all the aspects of reality. The educationists who took part in the design of the Fröndenberg *Gesamtschule* willingly recognise today that by limiting planning to the implementation of their model of individualised teaching, they neglected certain fundamental aspects of school life such as the development of social relations and the integration of subjects. In particular, the science department and the workshops department have been laid out for reasons of symmetry much more than with an eye to the educational aims formulated. Since this simulation cannot profess to have any scientific rigour, the problem comes down to knowing how to take a proper sample (5) of the fields and situations to which this simulation is to relate and for which operational models must be constructed. For example, what is called the « school co-operative » model, fairly widespread in France and used in an interesting way at Sainte-Maure-de-Touraine, can easily be formalised as an operational model making it possible to simulate activities linked with the social life of a school.

C. Determining Types of Facilities

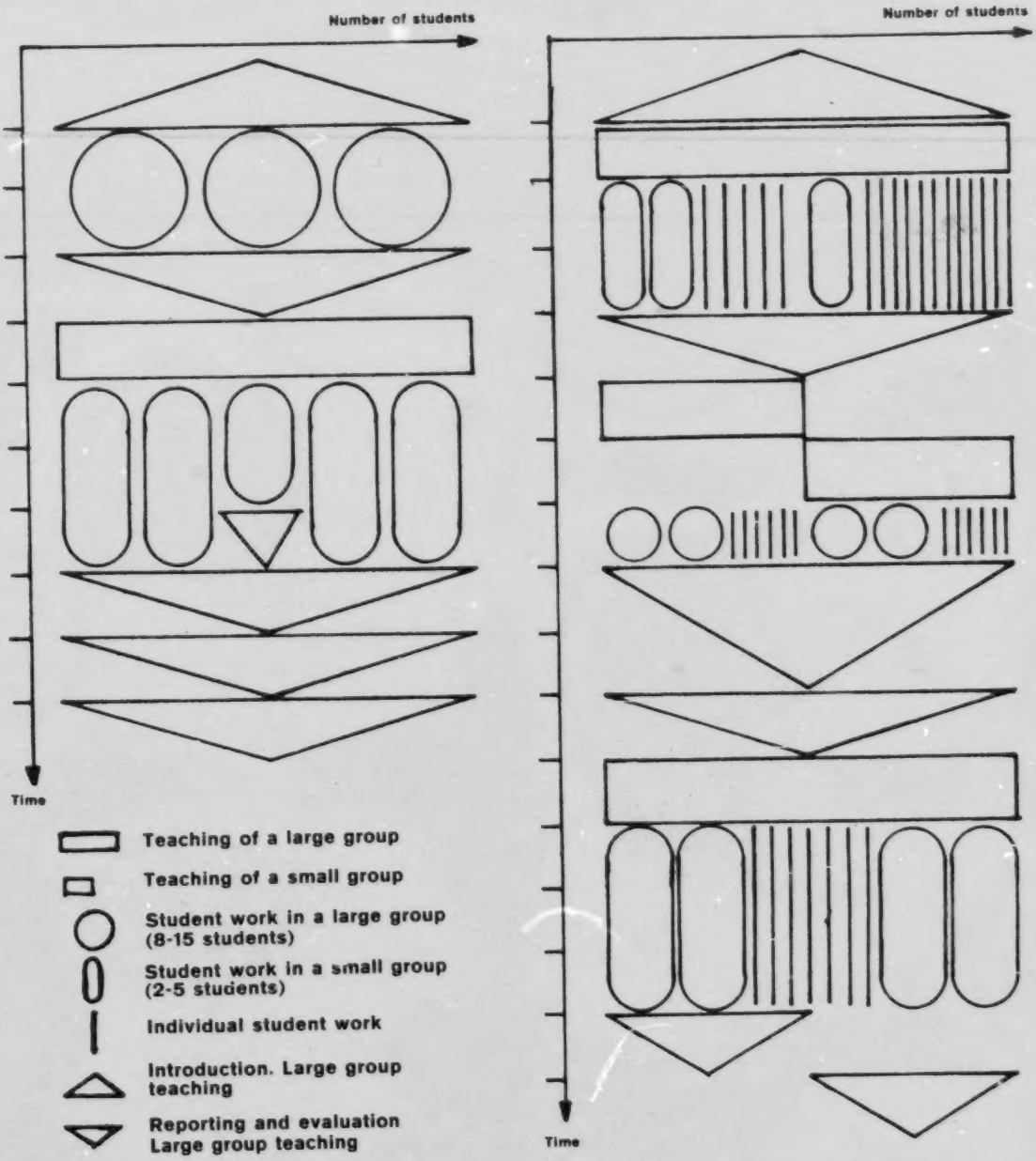
90. It might be thought possible to arrive at a one-for-one correspondence between the types of activities defined by simulation and the types of facilities. But this simplification is not really appropriate. That is why, for example, the LINS procedure cannot, in its present state, be applied to building projects. It leads in practice to matching an activity (a behaviour) in a given situation with a type of equipment. And while this may be appropriate in choosing pre-existing equipment, it may well be asked how this approach helps in defining and therefore, in a sense, inventing types of facilities. A defined type of facility often corresponds to several types of activities; this is the basic idea of the most rewarding instruments which the new schools have made possible: an information resource centre in a SEF school, for example, differs from a school library which is adapted to one type of activity only, namely the consultation and distribution of printed documentation. The centre is equipped not only for this type of activity, but also for the production of documentation, seminars, assisted self-learning and the showing of films (6). Conversely, it is found that the same type of activity needs different types of facilities: the complex composition of the science block at Henry Fanshawe School at Dronfield (England) shows, for example, that scientific discovery demands a whole range of facilities.

91. We are thus induced to seek a match between sets of activities and sets of facilities. This is what has generally been done empirically or intuitively in the

1) A phrase borrowed from the terminology of the LINS project, which classifies under this heading, for example, waiting, creating a disturbance, sabotaging the work of others, etc.
2) Paragraphs 32 and 33.
3) E.g. acquisition or reinforcement of the common core **(fundamentum)** or supplementary studies in depth **(addendum** 1, 2, etc.).
4) By the ingenious use of salvaged material.
5) There are, of course, no objective criteria for defining these samples. The problems can be solved only by joint dialogue and research in pluri disciplinary groups, as explained in Part Four.
6) See page 104.

FIGURE 3

Diagrammatic interpretation of long sequences two examples


Number of students
Time
Number of students
Time
Teaching of a large group
Teaching of a small group
Student work in a large group (8-15 students)
Student work in a small group (2-5 students)
Individual student work
Introduction. Large group teaching
Reporting and evaluation Large group teaching

Source : Based on S. Marklund: "The Role of the Teacher in Educational Innovation in Sweden" in **The Teacher and Educational Change: A New Role, General Report**, Vol. I, OCDE, Paris, 1974, page 312.

Note : This type of diagram is also used by some teams of teachers in planning their work.

design of many schools of the new type. But this approach does not seem to have been the subject of any clarification which would allow it to be perfected and used to advantage. It is not certain that the determination of sets of activities should strictly precede the definition of sets of facilities which could then be inferred. As far as it is possible to grasp work of this kind, records of which are difficult to get hold of and do not necessarily reflect reality, there seems to be a to and fro movement between the two whereby they are gradually clarified and elaborated by reciprocal confrontation. In this way sets of activities serve to test, correct and validate proposals for sets of facilities, and the latter are necessary to the former to which they give expression and the feasibility of which they can test.

92. In any event, two characteristics seem important for sets of activities:

a) They are never completely explained by the nature of the activities: they do not result from the objective attribute possessed by certain activities of naturally falling into groups; in other words, they involve the necessity of choice. In three different schools, for example, the same type of activities were seen integrated in different units, namely the information sessions for large groups which call for a receptive attitude on the part of pupils towards the presentations or demonstrations offered — with appropriate aids — by the teachers. In the Fröndenberg design, this activity is distributed among a number of similar sets of facilities in which it is closely associated with the learning activities in small groups and clearly dissociated from the many activities housed in the resource centre. In the Scharnhorst design, on the contrary, although connected with the learning activities in small and medium-sized groups, it is in fact isolated or, on closer examination associated with entertainment or information activities external to education. Finally, in the Värnamo design, it is an integral part of a set of fairly numerous and varied study activities (1); it is, moreover, integrated in a set of facilities which houses information activities for the adult population who make use of the school premises in the evening — use of documentation for self-instruction, leisure reading and individual listening to recordings.

b) The composition of these sets of activities is the result of proposals emanating from the educational concept underlying the design. It is therefore understandable, without need of further demonstration, that it draws on the one hand on the tensions of the model of functioning (a given distribution of expected activities may, for example, be the expression of the desire to maintain a constant relation between interdisciplinarity and specialisation of disciplines or between the individualisation of work and the development of social relations), and, on the other hand, on the conceptual diagrams of the model of educational procedure.

93. Be this as it may, we seem to arrive at two types of sets of activities which cannot be handled in the same way with regard to their implications for school building:

— the first consists of simultaneous activities, such as the project method where the pupils split up within the same space or set of spaces, and undertake very different activities, although their general objective is usually similar (2);
— the second consists of a sequence of successive activities, the passage from one to another, reversible or not, becoming the key point of this type of set of activities.

By way of example, it may be noted that the open plan solutions have generally been proposed as sets of facilities suitable for both these types of activities. It is unfortunate that they have rapidly become an instrument which arouses often passionate partisanship, for or against, without thought of comparing them methodically with the educational concept they express. If the passion is to be taken out of the debate on the open plan, it must be subjected to an analysis relating the expected activities (desirable according to the educational concept), the facilities provided, and the effective activities (real, observable in operation).

94. This example brings up the question of the main characteristics of sets of facilities. We are no doubt getting near to an acceptable definition of a set of facilities when we say that it is characterised by a spatial unity; this may mean that the facilities constitute a single space or that they are divided among several spaces with clearly marked continuity. By way of hypothesis, it can no doubt be suggested that the relevance of the language of the logic of « sets » should be tested in the event of it becoming necessary to formalise these approaches and definitions (3). But what is more important is to get back at this operational level to what has already been said in more general terms (4): facilities constitute a reality richer than that designated by the terms spaces or buildings; a working station is a set (5) of available facilities, consisting of a space defined in volume and quality, of furniture, of fixed or movable working equipment.

95. The practical consequence is that the design of facilities must integrate the design of the buildings with that of the furniture and equipment; this is generally regarded as a truism, but it is so rarely put into practice that it is worth recalling. This integration may be attained in various ways. The two most interesting types of solution seem to us to be the following:

— the inclusion of built-in elements of furniture; an example is Värnamo, where the study hall, library and domestic science accommodation include a certain number of built-in storage spaces and work-tops, designed and installed with the building;
— the development of modular furniture, in the form not of re-arrangeable items, but of extremely simple basic elements (panels, containers, etc.) offering an almost unlimited number of combinations. It is then sufficient for the modular dimensions to be compatible with those of the building. The *ff5* furniture used in the SEF schools is of this type and displays remarkable flexibility, the advantages of which we have already stressed (6).

III. Some problems of the determination of sets of facilities

A. Compatibility and Incompatibility of Activities

96. Sets of activities and sets of facilities can be composed only with due regard to the compatibility of the activities which it is desired to group together in the same set. The problem of the isolation of noisy or noise-sensitive activities has been familiar for a long time. But questions of compatibility took on a new light with the introduction of open plan solutions, that is to say, sets of facilities capable of accommodating diversified activities; it was subsequently found that not all activities desired were necessarily compatible within such solutions. It must, however, be noted that this idea of compatibility remains very relative; it does not necessarily correspond to objective facts. It is perfectly true that practising a musical instrument is objectively incompatible with the teaching of

1) These activities take place in the very vast open space, where they appear only exceptionally, being generally replaced by information in medium-sized groups which reproduces the face-to-face confrontation of the traditional lesson.
2) See paragraph 19: these activities correspond to options of types (d) and (e).
3) The danger of pseudo-scientific illusion may, however, prevail over the advantages of such formalisation.
4) Paragraphs 1 to 11.
5) It would be more consistent in the circumstances to say sub-set.
6) See paragraph 83 and **Information Leaflet n° 4**, "ff5 - A Canadian Casework of Furniture and Equipment System for Schools", by Paul Lenssen, Programme on Educational Building, OECD, Paris, March 1974.

choral singing, which it is generally wished to carry on in the same set of facilities, and that is why in a set of this kind soundproofed individual booths are provided, which may be glazed. But that is an extreme case. For many other activities, such as work in small groups, individual work and model-making, which may be carried on in the same large space, a sort of self-regulation is established which minimises nuisance. We have found that those who protest against the incompatibility of different activities in an open space are often those who want to use it in accordance with educational theories which conflict with this kind of facilities such as those who cut it up into areas reconstituting the traditional classroom to get back to face-to-face teaching. It is therefore more appropriate to speak of thresholds of incompatibility, which should be linked with thresholds of tolerance which themselves depend as much on the users as on the objective characteristics of the accommodation.

97. Compatibility is a parameter of negative value: it enables us to say what cannot be grouped together, but it tells us nothing about what is desirable. If, in order to facilitate transition from one activity to another, it is desired to group in the same set quiet activities (individual study, work in small groups) and more noisy activities (discussion in groups of 10 to 15, seminars, production of documents, use of typewriters, or even computer terminals), disorderly co-habitation is hardly an acceptable solution. There are solutions which make it possible to combine proximity and communication with such relative incompatibility. A good example is given by the general studies areas in the SEF schools in Toronto. These areas are in fact veritable complexes in which open spaces are punctuated with enclosed rooms of different sizes, some of which are both insulated and glazed; this applies in particular to the booth containing the two computer terminals. It is therefore evident that the disputes generated by open plan solutions are often unreal; the main point is the way in which open spaces and enclosed spaces are combined in the sets in which they are integrated. But these sets are not always seen as such by visitors or users. Teachers who have not adapted to their new school have been known to run away from the open parts and take refuge in the surrounding enclosed rooms, creating an opposition between these two types of space almost amounting to antinomy, which has disconcerted the designers. This no doubt shows that juxtaposition is not enough to give structure to sets of facilities and that these acquire their full significance only if their users consciously assume their unity.

19. The problem of compatibility. In this open area of 288 m² (3,200 square feet) a variety of activities is offered. However, not all of these activities can take place at the same time, thus confining the capacity of this area to 32 pupils, with 9 m² (10 square feet) per pupil as a result.
See plan page 98, industrial arts area.

20 and 21. Seminar rooms incorporated in the open areas. Pleasant View School, SEF, Toronto (Canada).

B. General-Purpose Facilities and Specialised Facilities

98. The specialisation of a facility tends to rule out all activities except the one for which it is designed (specific activity) and this lack of flexibility is a handicap to teaching practice in which activities vary and are partly unpredictable (1). An effort is thus made to reconcile the specialisation of accommodation with its ability to accommodate diverse activities. A few examples will indicate the difficulty:

a) At Fröndenberg the science laboratories are partitioned and small in size; each teacher therefore has to move from one to the other as the pupils for whom he is responsible occupy a number of them. The equipment is of high quality, but strictly adapted to individual laboratory work. This is because that is the way in which pupils are deemed to work there, while collective activities are housed in the information room for large groups. In practice, essential recapitulations, discussions of experiments involving 30 pupils, and even some non-scientific manual work all prove to be necessary in the course of laboratory work and subject the pupils to the uncomfortable constraint of facilities which are suddenly unsuitable for their activities.

b) In the Henry Fanshawe science block, groups of different size can be constituted in the same area and the layout affords more possibilities than the teachers and pupils know how to use.

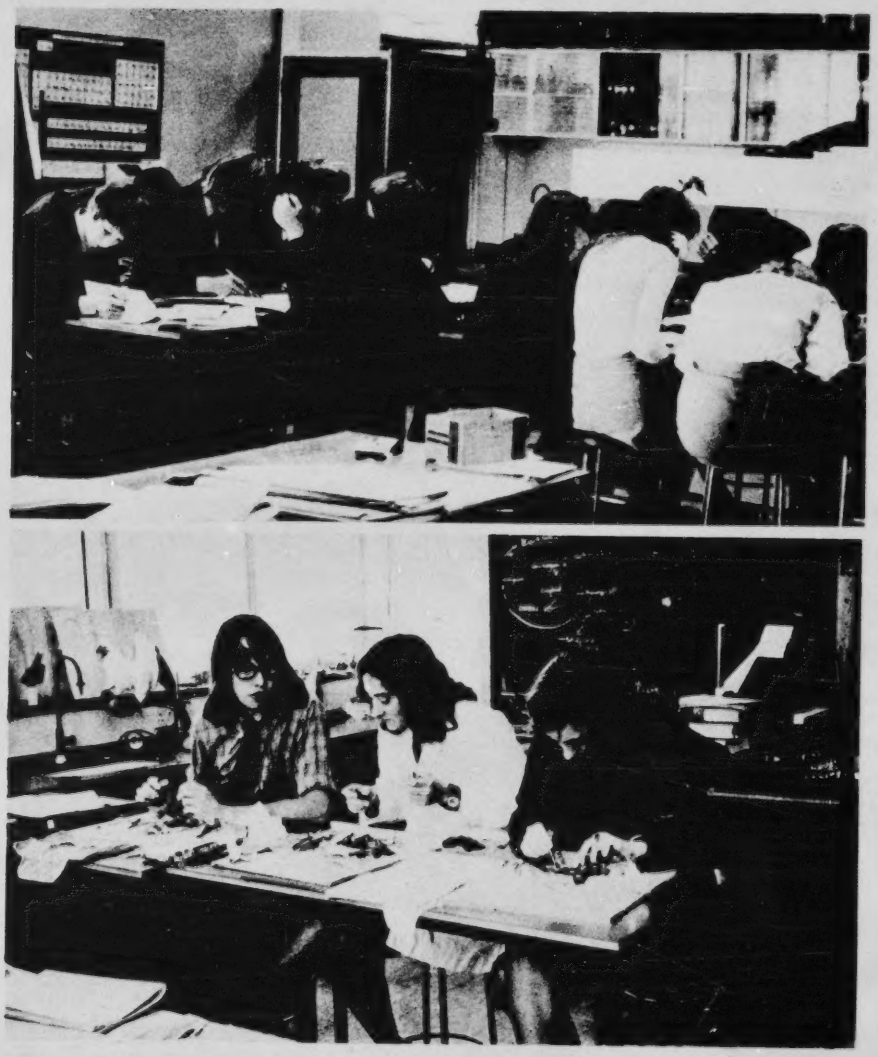
c) Finally, at Värnamo the science block is designed for the possible transformation of spaces and their equipment but its mobile elements (partitions and laboratory benches) have been permanently fixed for exclusive use for frontal teaching in groups of thirty.

99. At the other extreme, we find certain so-called general purpose areas with insufficiently differentiated equipment, consisting basically of tables and chairs, which remain sterile and encourage very few activities. In the light of experience it may be asked whether by trying to allow everything, in refusing to determine anything, they do not end by offering only very limited possibilities. Some of them are no more than inordinately overgrown classrooms of the traditional type.

100. All these facts suggest one conclusion. Proposals for new facilities are often based on concepts which have not been fully mastered. Is it certain that the contrast too often invoked between general purpose facilities and specialised facilities represents a real antinomy ? The general purpose concept is one of those most frequently used in school building today. Is it a precise and genuinely operational concept ? It can be found to include at least two meanings which should not be confused:

a) A set of facilities is said to be general-purpose when it can be used simultaneously for different activities. This is one of the main advantages recognised in the open plan. Another example is the sports complex which is general-purpose if it can be used for sport and dancing at the same time.

Specialised or general-purpose facilities



The facilities of the same science block at Henry Fanshawe School, Dronfield, put to two different uses.

22. In the "physics" area, the laboratory facilities are sometimes used for taking notes during a teacher's lecture which could be given more easily in the lecture room very near by. Does the poor matching between facilities and activities stem from the facilities or from the way the activities are organised?

23. The "biology" area displays a better match between activities and facilities.

1) See departmentalisation, paragraphs 70 to 74.

TABLE 6:
Subject places allocated to centres. Maiden Erlegh School (England)

	Lower School	English and languages	Humanities	Sci. Maths Tech.	Sci./ Home econ. Arts & Crafts	Drama Arts/ Music	Physical Education and Games	Study/ Commons	Main Library	Year 5 + Club	Totals
English	66	59	16			33					174
Drama	14					29					43
Languages		142									142
Science	29			108	133						270
Mathematics and Commerce	66		33	84							183
History, Geography Religion & Philosophy Economics and Social Science	92		175								267
Crafts & Technology				31	59						90
Home Economics					69	21					90
Art and Craft					52	24					76
Music						73					73
Physical Education (indoor)							84				84
Games											
Library Places	8	8	8	8	8	12			30		76
Senior Pupils' Study Places		14	10	14	10			30	40		124
TOTALS	275	223	242	245	331	192	84	30	70	—	1,692

Source : Building Bulletin N° 48, "Maiden Erlegh Secondary School", Department of Education and Science, HMSO, London, 1973, page 61.

see Plan page 44

b) A set of facilities is said to be general-purpose when it can accommodate different activities successively. One of the advantages of the open plan often passes unobserved, namely that it allows the temporary extension of an activity which occupies the whole of the space because the development of the education process so requires, giving place to a different activity in the next period. In this sense the assembly halls of the English schools, used in turn as dining rooms, extra gymnasia, meeting rooms for very large groups or as theatres or concert halls, offer a particularly economic diversity of use. The interest of this general-purpose character is that it is based on the possibility of installing successively in a relatively neutral area movable specialised equipment, whose design often displays a great deal of imagination.

C. Internal Composition of Sets of Facilities and Relations between Distinct Sets

101. There is no doubt no single methodology for the internal composition of sets. Everything which has been considered in the foregoing paragraphs helps to clarify such work. Setting out the possible procedures would merely amount to repeating it in a different form. It seems possible, however, to formulate a certain number of problems:

— It is generally admitted that the composition of sets of facilities is conceived before the relation between sets is tackled. In fact, the decisions involved in these two operations are interdependent. They are not so much phases in a process as points in a relation leading from one to the other;

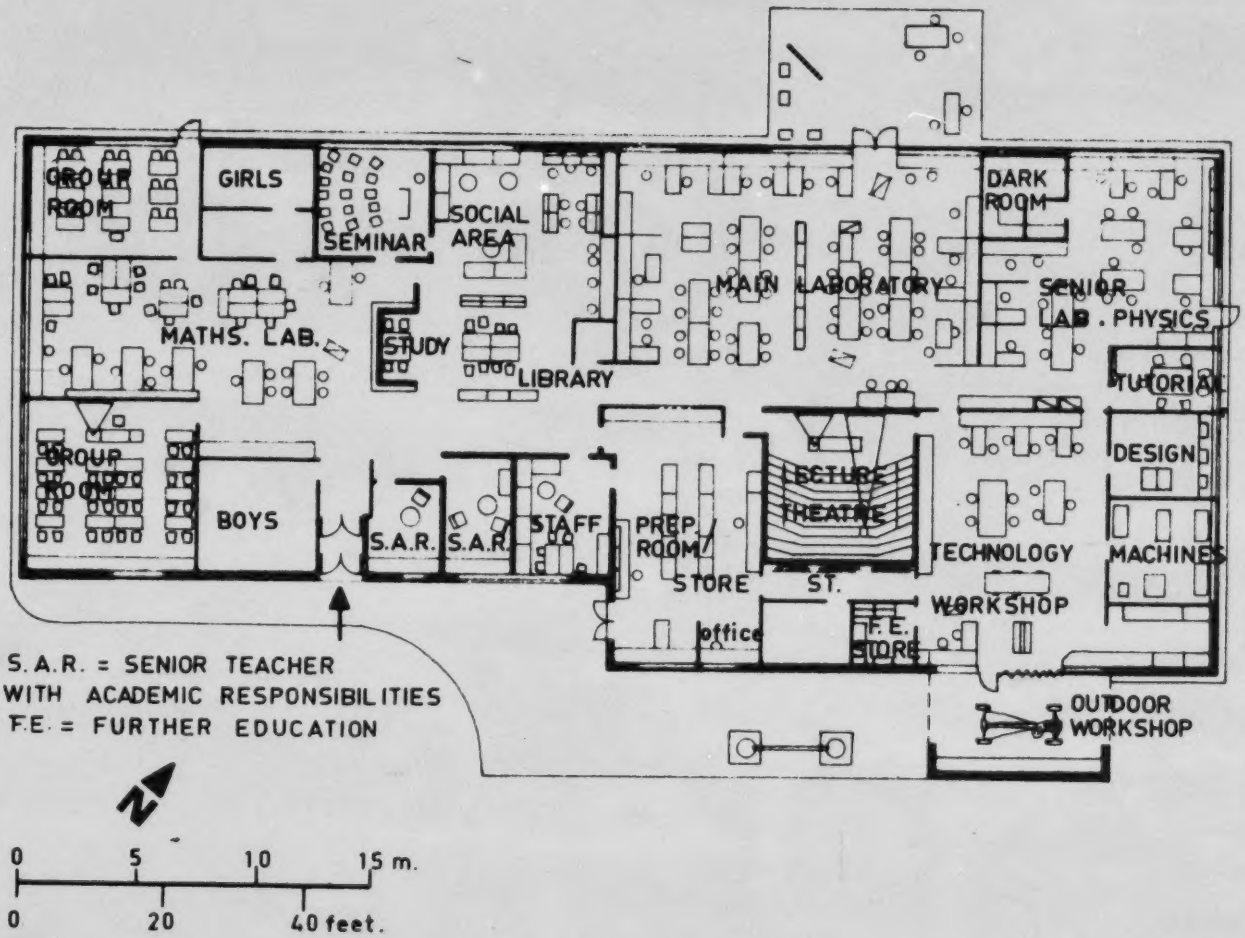
— These interdependent decisions involve different references: a great deal of stress has so far been laid on activities and much less on educational organisation. In this work it emerges as a necessary reference insofar as the diversity of groups, the arrangement of the succession of activities and therefore the planning of the occupation of the accommodation (1) influence the decision on the layout of facilities.

102. From this point of view, consideration of the brief of the Maiden Erlegh

1) These various factors can be integrated in the work of simulation which normally must continue throughout the briefing and design stages.

MAIDEN ERLEGH SCHOOL (England)

center for physical science, mathematics and technology



School (1) discloses both the multi-dimensional character and the flexibility of such work, which combines a multiplicity of parameters.

a) The principle of interdisciplinarity is interpreted in a completely new way: the attempt is, in effect, no longer made to define relations between specialised sets, but the composition of each set is arranged so that it gives expression to this interdisciplinarity. Thus specialised facilities are dispersed into the different sets; facilities for arts are found in three places and for library and documentation in six, in addition to the central library. This concept of an all-round set is a skilful combination of the general-purpose and of the specialised (specialisation of facilities within sets and semi-specialisation of sets by a chief characteristic).

b) The spatial layout of the school is governed both by the distribution of subjects and by the structure by age. The Lower School reserved for pupils in their first two years, is largely self-contained: 80 per cent of their activities take place in this centre, while the other centres are common to all age levels, except the Sixth Form Centre (2).

c) Finally, the distribution of activities connected with social life falls in with — or combines with — the distribution of other activities.

IV. The quantification of facilities

103. All briefing work must, in the last analysis, result in the specification of quantities. Although this is not the place to discuss this question, it may be noted that the whole of the foregoing analysis assumes that such quantification is indeed a culmination and not, as is too often the case, a starting point — or an intangible constraint. Everyone therefore recognises the need to quantify; what is less widespread is the recognition that this need, instead of being merely submitted to, can also be used positively. In so far as it cannot escape this necessity, the design of a school should fairly soon set priorities and lead to choices. Teachers or headmasters, asked what facilities they need or would prefer, often say that they would like to have available, both enclosed classrooms capable of accommodating all their pupils and additional open areas for the pupils' freer activities. The need for quantification leaves no room for this costly eclecticism. The quantification of facilities therefore requires a hierarchy of priorities which forms part of the analysis of needs as outlined above. The unit of account of this quantification is no longer accommodation of one type or another, but the place (3). What has been said in describing briefing procedures based on subject areas or activities is still valid in the work of quantification discussed here; the determination of the number of places by set of facilities makes it possible to adjust these to total needs (number of pupils in the school) and to specific needs (maximum number of pupils engaged on the same type of activity at the same time).

104. The maximum number of pupils who can simultaneously be engaged on an activity defines the capacity of a facility. As already indicated, it should include certain margins. Adjustments must, however, be made here in the light of the analysis of activities developed in paragraphs 80 to 93 and more precisely in 92 and 93. The number of places must be broken down by sets and sub-sets of facilities; it is thus a question of the maximum number of pupils engaged during the same period of time on a set of activities. It is therefore at the level of the set of facilities that the margins or adjustments necessary to the flexible functioning of the school must be calculated. The Maiden Erlegh brief shows how the distribution was arrived at in this case. In each set of facilities the number of places (maximum number of pupils) is higher than the average number of pupils expected to work there. But the difference between the two figures varies from one set to another; it is lowest (14 %) for the « lower school centre » where the lower school pupils carry on practically all their activities, and highest (26 %) for the science, domestic science, arts and crafts centre (4). The example of Maiden Erlegh raises the question of the quantification of sets. What can be quantified is the number of places resulting from the curriculum and times allocated to subject areas to which must be added the known adjustments. The probable supplement due to the system of options can then be estimated. But there will always be an indeterminate, non-quantifiable, part resulting from the unpredictable choice of options and the freely chosen work.

105. The nature of the places provided varies not only from one set to another, but also within the set from one sub-set to another. In this connection it will be noted in comparing the Maiden Erlegh brief (see Table 6) with the plan for a centre (such as the centre for physical science, mathematics and technology), that while the places are calculated by subject in the brief, this distribution is not to be found in the plan which, on the contrary, shows the different facilities not earmarked for a particular subject. What must be calculated therefore is the number of places in sub-sets, since these vary in cost from one sub-set to another. Cost for the moment is taken to mean not a financial indicator (which will need to be fixed eventually) but an objective demand in square metres (to be taken from a fixed total), and in what is needed for the work to be carried on such as carrels, laboratory benches, individual viewing points or chairs and tables. The cost therefore includes both the necessary space and the equipment.

106. The question then arises whether, in a given system, the cost of a place (space plus equipment) can be established on firm and objective bases. In fact, as we have already said, this cost is always the result of negotiation on the basis of objective data and is established by tension between demand and availability. It has, for example, been thought that there is an objective norm for the area necessary for a place in an open space. A group of experts, basing their work mainly on acoustic criteria, has been able to fix it at 4 m2. But in the Fröndenberg large room the area/place ratio is 2.30 m2, and in the general learning areas of the Toronto SEF schools it is 2.80 m2.

107. It can similarly be shown that while anthropometric data can indicate the length of bench needed for a laboratory place, the possibilities afforded by such a bench — and therefore its cost — may vary widely according to the equipment which comes with it. In fact, the pseudo-standards which are published and sometimes enforced must not be regarded as scientific — they are based on empirical approaches and they can sometimes be regarded as convenient. If the norms are the result of negotiation, they should always be open to re-negotiation, naturally within overall limits which must clearly be fixed, for planning to be possible. Similarly, this negotiation must not be developed on the financial plane alone but must also bring in the advice of users capable of assessing the expected performance of the equipment which characterises a given working place. This negotiation should be comprehensive enough to raise the problems in terms of the distribution of means, that is to say, finally, the breakdown of

1) **Information Leaflet n° 2**, "Maiden Erlegh-An English Secondary School Development Project" by Clive Booth, Programme on Educational Building, OECD. May 1973 and **Building Bulletin n° 48** "Maiden Erlegh Secondary School", Department of Education and Science, HMSO, London, 1973.

2) Paragraph 58.

3) Paragraphs 70 to 73.

4) It is understandable, on the other hand, that no margin is foreseen for the distribution of numbers between "social bases" (which provide pastoral places).

TABLE 7:

An example of specification of facilities starting from the time-table and using the concept of the working place

7A — **Area required per pupil according to activity. Types of working places:**

	m²*
a) Informal lecture and discussion without fixed seats and lecture demonstration room with fixed seats. (Equivalent to 60 pupils in a 55 m² room)	0.92
b) Classroom type work where a writing surface is provided for each pupil. (Equivalent to 30 pupils in 55 m²)	1.85
c) Investigation type spaces for project areas, geography and mathematics spaces, elementary science. (Equivalent to 69 m² for 30 pupils)	2.30
d) Art and light craft space including needlework. Science and music studies where large scale instrumental work is expected. (90 m² for 30 pupils)	3.00
e) Workshop crafts and home economics, drama workshops, individual science projects	4.60
f) Physical Education (Greater for Sports Hall type accommodation)	8.30

7B — **Example of distribution of pupils according to the periods in a day**

Subject	Periods per week	Period									
		1	2	3	4	5	6	7	8	9	10
Science	40	149	149	149	149	0	0	149	149	149	149
Mathematics	40	162	162	162	162	0	0	162	162	162	162
English	40	165	165	165	165	0	0	165	165	165	165
Modern Languages	40	99	99	99	99	0	0	99	99	99	99
Humanities	40	213	213	213	213	0	0	213	213	213	213
Office Arts	40	21	21	21	21	0	0	21	21	21	21
Arts and Craft	40	64	64	64	64	0	0	64	64	64	64
Music	40	61	61	61	61	0	0	61	61	61	61
Workshop Crafts	40	75	75	75	75	0	0	75	75	75	75
Home Economics	40	64	64	64	64	0	0	64	64	64	64
Indoor Physical Education	40	57	57	57	57	0	0	57	57	57	57
Outdoor Physical Education	40	57	57	57	57	0	0	57	57	57	57
Uncommitted	40	13	13	13	13	0	0	13	13	13	13
TOTALS		1,200	1,200	1,200	1,200	0	0	1,200	1,200	1,200	1,200

7C — **Distribution of Workplaces and Area Calculations based on the example of Table 7B**

Subject	Number of Work-places	Percentage Margin (approx.)	Total No. of Work-places	Workplace Type and Area per Workplace						Total Area required for each Workplace Type						Total Area each subject m²*
				a	b	c	d	e	f	a	b	c	d	e	f	
				0.9 m²*	1.8 m²	2.3 m²	3 m²	4.6 m²	8.3 m²							
Science	149	25	185		20	40	125				37	92	375			503
Mathematics	162	15	185	15	95	75				14	174	172				360
English	165	12.5	185	25	120	40				23	120	92				335
Languages	99	15	115	25	45	45				23	83	104				210
Humanities	213	12.5	240	30	120	90				28	220	207				455
Office Arts	21	25	25			25						58				58
Art & Craft	64	20	75				60	15					180	69		249
Music	61	25	75			25	45	5				58	134	23		215
Workshop Craft	75	25	95					95						437		437
Home Economics	64	25	80				30	50					90	230		320
Indoor P.E.	57	20	70						70						580	580
Outdoor P.E.	57		Outside													
Uncommitted	13	25	15		15						28					28
TOTALS	1,200		1,345													3,750

* 1 m² = 10.76 square feet

Source : **Plans and People, Secondary Education: the Brief and the Buildings,** Lancashire Education Authority, England, pages 17, 18 and 19.

Note : Areas exclude reference, library, private study, social and non-teaching areas.

TABLE 8:

Activity Pattern and Average Area per Place per Subject (Maiden Erlegh School, England)

(The classification of activities and the quantification are different from those found in Table 7).

Subject	Proportions of time by subject spent on different activities (%)				
	Reading, Writing, Discussion, Exposition 1.85 m² per place	Light Practical 3.25 m² per place	Heavy Practical 4.60 m² per place	Movement or large projects 8.30 m² per place	Average m² per place
English	100	—	—	—	1.85
Drama	30	—	—	70	6.50
Languages	100	—	—	—	1.85
Science	30	70	—	—	2.75
Mathematics	75	25	—	—	2.20
History, Geography, Religion and Philosophy, Economics and Social Science	75	25	—	—	2.20
Crafts and Technology	—	—	100	—	4.60
Home Economics	—	65	35	—	3.60
Art and Craft	—	100	—	—	3.25
Music	30	70	—	—	2.75
Physical Education (indoor)	—	—	—	100	8.30
Games (outdoor)	—	—	—	—	—

Source **Building Bulletin N° 48, op. cit.**, page 59.

Note This table reflects a realistic forecast of the probable situation in the early 1970s. Changes in teaching method, perhaps involving increased use of teaching machines or programmed work, will probably be accompanied by an increase in the amount of practical work in the same subject, and the overall area will remain very similar, but be distributed in a different way.

places according to different types of facilities; what is brought into play is thus:

a) The variable cost of a place according to the different activities and types of facilities (it may, for example, be estimated that in order to increase the number of workshop places by one, the number of places in the general learning area must be cut by two or three).

b) The order of priority which analysis and educational choices give this or that type of activity or combination of activities.

c) The thresholds below which it is not possible to fall, and which can concern: the number of places by activities or by subject areas; the minimum equipment of various types of place, etc. They are generally used in the definition of the necessary safeguards (minimum requirements).

1) The Information Centre for School Building (**Informatiestichtung der Scholenbouw - ICS**), Netherlands, makes tests on mock-ups of schools which involve processes somewhat comparable to those which we have tried to outline.

V. Conclusions

108. It must be added that the long and unspectacular work which we have tried to clarify by identifying its difficulties and processes — without always escaping the risk of formalism — must remain an open task. A project for a multi-option school must always allow a certain necessary indetermination.

a) This indetermination responds, in the first place, to the character of the education of options and the exercise of freedom of choice which it presupposes. Each one of the types of options defined in Part One implies the absence of rigid and definitive limits between the types of activities or between the facilities in which they go on. Furthermore, the capacities of these facilities must be able to vary to enable them to adapt themselves to the temporary extension of an activity or to changes in the distribution of activities over time.

b) Another source of indetermination is that it must be possible to envisage an evolution in the method of allocating space and facilities in a school. Generally, this allocation is decided at the level of the design of the project. an explicit assignment to precise zones of the types of activities is made as precisely as possible. It is well known that the real life of a school takes certain liberties with this prescription. In the majority of cases, this first decision is reinterpreted by those who administer the school who, in directing the real organisation and functioning of the school, assign (in line with the designers' prescriptions or not) the facilities to the activities organised. It would be consistent with the objectives of the multi-option school to envisage a third possibility namely that where a group of teachers, having at their disposal a set of facilities, settle among themselves how these facilities shall be assigned to their activities. This assignment would not be the result of a fixed rule that is adopted; it can and should vary, within certain limits, in the course of the development of educational practice; it is therefore the subject of a series of decisions which integrate it into the life of the school.

c) Finally, if the design of the school integrates models, particularly models of educational procedures, it must leave open the possibility of devising new procedures, or of modifying at any time the educational organisation. A good way of ensuring this is to reiterate, on the project already specified, a simulation based on different assumptions from those which gave it birth. Alternative operational models therefore ought to be made available at the time of design so that proposals based on a preferred model could be tested before they are finally adopted, to make sure that they are adaptable to different models (1). The question whether these operational models should or should not be within the framework of the educational model of the multi-option school, remains open.

109. These few indications result in a certain interpretation of flexibility. This idea is too complex to be dealt with properly here and should be the subject of a special study. We have found that flexibility could serve to mask uncertainties or refusals to make a choice. In this sense it can assume a mythical aspect and, rather thoughtlessly, become an article of faith for some people. This real danger, however, does not allow us to avoid the problem of knowing how to reconcile at the same time, flexibility — the need for which provides a certain margin of freedom in the functioning and allows for the future appearance of unforeseeable needs — and the need for precise determination of present requirements in the design of the building; flexibility and adaptability can be no excuse for indecision.

Part four:

INSTITUTIONAL ASPECTS

49

I. Implementation of design processes

A. Diversity in Experiences and Common Problems

110. What has been said in the last two Parts has not been aimed at proposing a method for designing and providing the best possible facilities for the multi-option school. However, we have tried to define the main conditions necessary for developing a coherent method. There is in fact no single method but a number of requirements which the different methods must necessarily meet in order to be fully effective. These requirements have been identified from the study of the work of the various teams responsible for the design, construction or running of schools which satisfy our definition of the multi-option school, that is to say, from the analysis of their real difficulties and from a broadening of their many intuitive ideas. In the same way, we shall try in Part Four to specify and identify the problems encountered in the implementation of design and execution; it no longer concerns the methodological approach but rather the organisation of the work. It would indeed be pointless to help to improve design methods and the structuring of the briefing processes without at the same time being concerned with the institutional framework in which these methods and processes can be effectively developed.

111. For a better understanding of the difference between Part Four and the two preceding Parts, we may recall that in paragraph 63 it was made clear that the briefing and design work in relation to the multi-option school could be carried on at two levels: the elaboration of a reproducible type of school and the working out of proposals for individual projects. From the methodological point of view there was no difference between these two levels. But the type of problem which must now be tackled leads, on the contrary, to drawing a distinction between them, and to considering how the work is organised differently at each level and what relationships there are between them. Similarly, we have already noted the intervention of certain constraints of an institutional nature, such as norms and cost limits (1). But they have been considered in terms of their characteristics and their consequences for the methodical development of briefs. Another point of view must now be considered in which the institutional character of norms and cost limits will be taken into account. From this point of view, the intervention of norms and the use which is made of them evidence, or depend upon, the nature of the relations between the various parties concerned in projects of an innovative type (the multi-option school). It must be examined what type of organisation and what modes of relation are likely to bring about an intervention (of norms and, more generally, of constraints) satisfying the methodological requirements identified.

112. This task is, without doubt, a difficult one, since this study is intended to be of use in the very different situations of the various countries concerned. In the field of implementation, this diversity would appear more evident than in those so far explored. In effect:

— as shown in the preceding Parts, the concept of the multi-option school takes different forms and is expressed in different ways according to the country concerned;
— briefing and design procedures in school building vary widely from one country to another: to the differences in educational concepts and contexts are added the differences between administrative practices and traditions and between the structures of decision-making, of initiative-taking and of control;
— finally, it clearly seems that the development of the multi-option school is helping to transform the very significance of school building. In this evolution the countries under consideration find themselves at different levels. In some countries the traditional concept of the building as a neutral setting for educational activities is scarcely beginning to be challenged, or is even, in spite of all we have said ever since paragraph 1, gathering strength while hiding behind modern ideas such as general-purpose facilities or flexibility. In other countries, under the influence of a faster development of innovative formulae, such as the multi-option school, the majority of educationists and educational administrators regard school building as a tool, an instrument essential to the development of educational processes. Finally, in some countries, recent experiences already point to a new concept of educational space as the outcome of the creative educational activities themselves.

This wide diversity complicates the first task we set ourselves of identifying common problems (2). Nevertheless, we think it must be accepted, as we have so far done, that similarity of the problems in no way implies a hierarchical ranking of the solutions adopted in the different countries; subject to this condition, it is legitimate to think that, in the field of the organisation of work and the institutional aspects, the specific character

1) Paragraphs 105, 106 and 107.
2) Paragraph 4.

50

of the situations in the different countries is no bar to common consideration of the fundamental preoccupations.

113. The multi-option school is an expression of the search by the democratic industrialised societies for a system of secondary education in which everyone has an equal chance and where the potentialities of each individual can develop to their fullest. We have demonstrated the complexity and wealth of this concept in Part One. In Part Two we have situated this search within a network of tensions between aims and principles which are pursued simultaneously and which may come into conflict. It is within this network of tensions that each multi-option school, or each school system inspired by it, must choose its concrete form of organisation and of teaching by giving itself the means for a frank confrontation with each of these tensions. It is a difficult task to design and construct facilities to match this complex concept. We have seen that it never follows a simple procedure like interpreting an idea into an organisation of space. It calls for numerous and, let us admit it, complex approaches: development of models; simulation; multi-dimensional analysis of activities; determination of facilities as quantified sets matching sets of activities. These approaches have been analysed in Part Three; they are recalled simply for the purpose of stressing the multiple aspects of this task and the diversity of the skills it requires.

B. The Collective Nature of the Tasks of Briefing and Design

114. The foregoing remarks lead to the conclusion that the work of which we have spoken is necessarily a collective task. This conclusion can be more precisely grasped by considering the following details by way of example.

— Can the models which enter into the work of design — models of functioning, operational models — be defined and worked out by an administrative authority or by a few experts ? A new and interesting idea emerges in the recently published Curricula Guidelines for the 5th and 6th years in the *Gesamtschulen* in Nordrhein-Westfalen: curriculum is defined as a « dialogue » and its objectives presented as « common fundamental points arising out of a situation of dialogue ». Can it not be said that an innovative model such as that implied in the multi-option school should be similarly defined as the expression of a dialogue between the various parties concerned in a new project ? Without this character it is in danger of being confined to the role of an image without becoming really operational. The example of the Frön-denberg architectural model already cited (1) is significant: proposed by an expert, it was regarded as purely theoretical until a working party had radically changed it to make it usable.

— The « necessary indetermination » which must enter into every project (2) must not be confused with a facile approximation. However, it cannot be translated into precise specifications, which would seem to be contradictory. It can therefore be introduced into projects only by discussion of preliminary plans submitted for the criticism of those directly concerned in the use of the facilities. This is true not only for the margins of capacity to be allowed for optional activities or freely chosen activities, but also, and above all, for the flexibility essential to the possible adaptation to models which are different from those initially used in the design.

115. This feature of briefing, which is implicit in the very characteristics of the multi-option school, should lead to the questioning of certain procedures widely used in several countries. One is the procedure of an « order » placed with an architect by a client who may be a local, regional or national authority responsible for school building. It isolates, and sometimes opposes, those responsible for specifying the « order » and those responsible for interpreting it, since these two tasks are dissociated. The same is no doubt true when the services responsible for organising and carrying out the building act as technical and administrative agents, intervening after the competent educational authorities have defined the needs and concept of the school. Not that these various services do not get together; but each works from its own point of view and within its own field of competence, so that their exchanges remain unfruitful in so far as they do not share responsibility. Finally, the procedure of competitions, at least in their conventional form, is greeted with doubt almost everywhere when it comes to multi-option school projects. Competitions often mobilise imagination and creative thought, but they paralyse the exchange of information and establish barriers between the competitors thus reducing to next to nothing the attempts at dialogue.

116. The responsibility for working out and putting into practice procedures more suitable than these for the process of briefing and design described in Part Three is, in many cases, somewhat ill-defined; often it is not even assigned to any particular person or body. In the organisation of educational systems in all countries responsibility for defining the objectives of education is clearly assigned to the regional or national authorities charged with defining educational policies. Similarly, in the organisation of school building, responsibilities for shaping projects and for controlling them technically and financially are clearly defined. In the case of current buildings of known and proved types, the interplay of the brief as planned, of the norms and regulations is enough to bridge the gap between these two levels of responsibility. But we have already seen that this way of proceeding (3) assumes that the problem of matching the demand for and the provision of facilities is resolved, and that it is no longer suitable when it comes to designing facilities appropriate to an innovative type of school, such as the multi-option school.

117. The question which then arises is how to constitute the intermediate level at which would be assigned responsibility for translating educational objectives into models of functioning and operational models with a view to determining the necessary facilities. The question must also be asked whether it is not at this level that the structures of dialogue which we have found to be necessary should be organised. There are two ways of constituting these structures and defining these responsibilities: either empirically by the virtually spontaneous creation of ad hoc groups whose activity comes to an end with the completion of the project, or institutionally by setting up permanent and recognised structures. In the countries where we have witnessed the development of multi-option schools, both types of organisation exist and formulae can even be found which lie halfway between the two. Their functioning generally raises quite a number of problems which we shall have to consider.

II. The framework of constraints

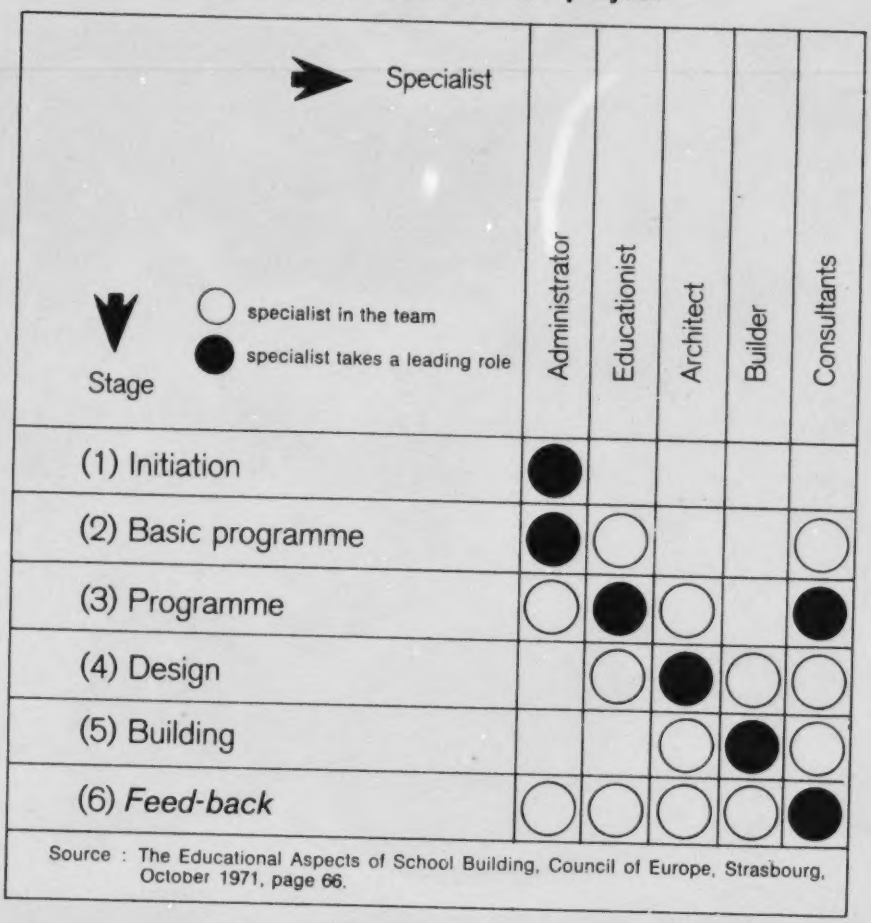
A. The Positive Use of Cost Limits

118. Before tackling this question, one must first clarify the framework of constraints within which the bodies concerned will have to work. The first element to be considered in this connection is cost limits. Cost limits are generally felt to be a constraint. The fact that they exist,

1) Paragraph 34 (b) and (c).
2) Part Three, Conclusions, paragraph 108.
3) Paragraphs 25 and 26.

FIGURE 4

An example of organisation of the design and implementation of a project



Source : The Educational Aspects of School Building, Council of Europe, Strasbourg, October 1971, page 66.

however, is often, quite naturally, confused with the actual level of the limit at a given moment. When these two aspects can be distinguished, the existence of such limits may prove to be a stimulus in the work of briefing and design in so far as it requires the desirable to be considered in the light of the possible, therefore compelling a choice. We have already made the same point in slightly different form in connection with the quantification of facilities (1).

119. In addition to this role as a stimulus, it must be recognised that cost limits have a second positive role: they allow the fairest possible distribution of resources. Cost limits provide a key or a rule for this distribution, so that the available means are rationally shared among the various regions, among the communes of the same geographical area or among various projects. The problems which cost limits raise more particularly in the briefing and design of multi-option schools are mainly of two kinds.

120. The weight of the constraints imposed by cost limits (or cost ceilings) differs according to the way in which they are administered or regulated. Simplifying the question, there may be said to be two ways of fixing them, which are well known; various countries, for their own special reasons, adopt one or the other of these methods.

— The first is to base the cost limits on a calculation which takes account of the quantity and nature of the areas and the installations needed for a given type of school (generally defined by its size or capacity and level of education involved). The cost limit of the building is defined by applying prices, fixed per unit of area or per item of equipment, to the prescribed areas of different kinds and the different items of equipment specified.

— The second is to determine cost limits by defining a unit cost per pupil place. The principle then is that the maximum cost is proportional to the capacity (number of pupils) of the proposed school. It is well known that this proportion is not a simple one, since, first, small schools must allow a relatively larger part of the total area for non-educational purposes than schools with a large capacity, and, secondly, it is recognised that certain categories of pupils require more costly facilities than the average (e.g. terminal classes, special education). These differences are generally integrated by using the simple idea of the « cost place » as unit of account. It will be understood that this idea differs considerably from what we have called the cost of a place in paragraph 105, in defining all that is necessary for a working place.

121. It is not part of our task to discuss the respective advantages and disadvantages of the two systems, which has already been the subject of other studies (2). It is however useful to look quickly at the incidences of these provisions on the work of those responsible for the briefing and design of multi-option schools. The two systems arrive by different routes at their common objective of limiting expenditure. This has become essential for a coherent school building policy, which must not only allocate the available resources fairly and rationally but must also know this allocation in advance. The ways in which this objective is reached however, are not the same with regard to the effort of innovation implied in the development of multi-option schools. Under the first system, in effect, the cost ceilings are determined by the cost of a certain combination of specified and quantified items. The ceiling cost therefore presupposes a certain type of facilities or layout. This combination therefore often results in a crystallisation, either because its hold is too great on the designers, or because it leads to a polarisation of their criticisms. This system therefore considerably limits the freedom of design.

122. More generally, it can be said that any innovation — and innovation is always implied in the building of the multi-option school — calls into question the specifications on which the cost

1) Paragraph 103.
2) Guy Oddie: **School Building Resources and their Effective Use**, OECD, Paris, 1966, Chapter VIII.

52

ceilings are based and would logically require most of the cost calculations to be reworked. That is why, in some countries where this system is in force, efforts have been made to allow innovation by tolerating equivalences between old specifications and new specifications, or by calculating on the basis of a notional brief the total amount of money available to the designers and accepting a new interpretation of the brief. But this approach, while making control difficult, often creates an unfavourable climate in so far as the attitude of tolerance confers an exceptional character on innovation without giving it any rights.

123. This leads us to recognise the much more liberal character of the system of setting a ceiling to expenditure through a system of « cost places ». In practice, the estimated cost ceiling of a school, whatever its brief, bears a direct relation to its scheduled capacity. The allocation of the total sum available between the various types of facilities is the full responsibility of the design team.

124. Setting a ceiling on expenditure raises another type of problem: does innovation involve additional costs ? The answer is not simple, and the diversity of the situations met in the different countries forces us to question the relationship between this limitation of costs and the development of innovations in school building. In England it is generally regarded as essential that any new types of schools should strictly observe the overall cost limit; the opinion is very widely held that this constraint is in the interest of the new solutions proposed, particularly insofar as the designers have to decide whether the new demands generated by the new types of schools can be brought within the limits specified or whether certain sacrifices must be made. It is well known that this approach has led, for example, to a considerable cut in circulation area generally underused, and an appreciable increase in the percentage of teaching area in relation to total area (1). On the other hand, the designers of the new *Gesamtschulen* in Nordrhein-Westfalen consider that they can be constructed only at an extra cost of 20 per cent above the old type schools; the Land authorities have authenticated this margin in view of the experimental, not to say exceptional, character of the *Gesamtschulen*.

125. It is quite clear that respecting cost limits makes innovation more credible and more acceptable, and that higher costs induce the authorities to put a check on innovation or to make it a marginal activity. Nonetheless, this in no way proves that such higher costs are unjustified; it is equally difficult to prove that they are essential. To elucidate this question, which is as confused as it is important, it would be necessary to be able to analyse various aspects of the context in which an innovation develops. It is in fact probable that in this context the answer depends on the level at which the satisfaction of educational needs lies and on the real pressure of the new needs which the innovation is intended to satisfy. It struck us as significant, for example, that the SEF schools developed by the Metropolitan Toronto School Board adopted different solutions according to the level of education: for primary schools excess costs of 20 per cent above ceiling costs are recommended; this excess is justified, in particular by the need to change the functions of the school (2). Intermediate schools, on the contrary, are constructed within the cost ceilings: only audio-visual and typing facilities are allowed as extras. Finally, we think it important to recall here that the level at which the ceiling costs are set depends on the real tension between educational needs and available resources. It therefore represents a political equilibrium.

B. New Formulation of Norms

126. Norms or standards form the supplementary constraint to cost limits from which, however, they differ. They can be defined very generally as regulations applicable to school building. They relate both to the areas and volume necessary per pupil and to the detailed description of the equipment required. They respond to the same needs for control and planning as do cost limits. They also save the time and effort of those responsible for individual projects who cannot, on their own account, re-do all the studies or inquiries on which they are based; predetermined norms or standards therefore help them to strike a balance between the possible and the desirable. At the same time, systems of norms often tend to become so inflexible and to be imposed so firmly that they paralyse the necessary reflection on individual projects. Norms become all the more of a constraint when one loses sight of their primary function of solving in advance a certain number of problems of a general character. Time in fact creates a lag between norms and reality, since problems evolve faster than the standardisation of solutions.

127. The development of building projects for schools of the multi-option type fairly often arouses conflict between the system of norms in force and the new needs brought to light by these projects. The new facilities they propose generally fall outside the system of norms if this has been established for types of facilities which have been discarded by the new projects. The conflicts arise not so much out of the fact that the norms and the rules are infringed, but much more out of the fact that the norms are not pertinent to the new solutions proposed because they had not foreseen these solutions.

128. These problems are found in all countries, but the solutions adopted for them vary; some countries are content to follow a system of special exceptions in favour of projects of which the innovative character is recognised and admitted since in principle the general character of the norms in force is not questioned. Other countries have worked out new systems of norms, known as alternative norms, which exist alongside the old norms. They are better adapted to the new situations and those responsible for building an individual school can adopt them or not. Finally, in other countries, a thorough experience of school building problems allows the importance of norms to be greatly reduced in favour of guidelines or practical handbooks. The element of control is thus diminished and the advisory element augmented. The more general problem raised by the development of multi-option school projects is too important to be dealt with here: the question is how a process of school building can make it one of its permanent functions to adapt norms to new problems. It may simply be indicated that this function cannot be filled without dynamic co-operation between those responsible for educational practice and those responsible for school building at the various levels of administration of the educational system.

III. Institutional organisation of the work

129. We can now revert to the question outlined in paragraph 117 with a view to clarifying it. What are the institutional arrangements which, in the context of the constraints we have just analysed, permit the successful briefing and design of multi-option schools ? This should not be interpreted too formally as the search for a new administrative structure, but simply as the questioning of the *de facto* structures. Furthermore, it is not our place to suggest a real solution here to this problem, which is in itself the subject of another activity of the Programme on Educational Building. A certain number

1) An average of 60 per cent for all the new projects carried out by the Derbyshire Local Education Authority.

2) **SEF E1, Educational Specifications and Users Requirements for Elementary K-6 Schools,** Ryerson Press, Toronto, Canada, 1969, pages 74 to 76.

53

of consequences which flow from our earlier analyses in this field may, however, be noted.

A. A Research and Design Group as Exchange Vehicle in the Decision Hierarchy

130. In the range of decision-making levels, from the determination of school building policy to the detailed execution of an individual project, a gap can be noticed at the intermediate levels. It lies mainly at the level of the dialogue between the architects and the educationists. Each of them fail to define their respective responsibilities very clearly, and the situation is such that the architects are often induced to fill the vacuum with which they are confronted: the study of the educational concepts, the models, is not carried through to its practical conclusions, expected activities are insufficiently analysed and so forth. The architects then take risks by proposing solutions or facilities which may seem arbitrary or too systematic and they are often blamed for confusing the quality of the visual environment with educational criteria. Not that, in general, they display over-pervasiveness but rather that the imprecise definition of needs does not enable them to adjust their decisions — which they cannot evade — to what is expected of them.

131. It is to bridge these gaps and improve the work of briefing and design (simulation, for example, can be done only in co-operation between architects and educationists) that similar groups, or at least groups with similar aims, have been set up in different countries. We may cite again, by way of example:

— SAMSKAP: a mechanism for co-operation between architects and educationists in a number of local authorities in South-West Sweden;
— SEF (Study of Educational Facilities), Toronto;
— the development group constituted in England at the level of the Department of Education and Science.

132. Finally, we have found that the briefing, design and building of the multi-option schools observed in the course of this study has always brought about the formation of mixed groups of architects, educationists and administrators. All these groups are generally large: heterogeneous in composition, they bring together not only experts (architects or educationists) but also administrators and politicians, representatives of parents, and even of pupils, and teachers. Their main working assumption is that briefing and decisions about the schools of a new type are a matter not only of competence (in both the technical and administrative sense) but also, and above all, of communication and confrontation of the points of view of all the interested parties.

B. Problems in the Functioning of the Groups

133. **Problems of Communication.** It is often difficult in these groups to discover a common language — for example, between architects and teachers. This arises primarily from a certain specific character of ways of thinking and of ways of expression frequently used. Architects, for instance, easily express themselves by diagrams and plans which teachers can read only with difficulty. In addition, and above all, the confusion which we have already noted between type of activities and type of facilities paralyses the expression and the translation of needs.

134. **Problems of information and research.** In general, the work of these groups lends importance to the collection of input information for the elaboration of the projects. The territorial architects and inspectors in England spend a lot of time observing the real practice of teachers and the various educational situations. These groups, or some of their members, visit interesting projects and multi-option schools already completed. Similarly, the observation of spontaneous adaptations of existing buildings (1) is a good pointer to real needs. The question is whether empirical observation, however responsible and attentive it may be, is enough, or whether the contribution of scientific research must be called upon, particularly by arranging for the intervention of experts outside the group. In Nordrhein-Westfalen the use is made of the term « accompanying research » for the *Gesamtschule* experiment, stressing the importance of research for the development of educational methods, while denying that such development is dependent on research. No doubt such « accompanying research » should be introduced in school building briefing and design procedures.

135. **Problems of scale.** The work of briefing and design is a long job. It calls for a certain continuity which is sometimes inconsistent with the too-short interval between the decision to build and the invitation to tender. This also proves that such work cannot be done meticulously for each individual school building project. Many studies can be undertaken only with an eye to a series of constructions of similar type. The experience of SAMSKAP and SEF confirms this; their initial work has enabled over a dozen schools to be built. After this first phase, evaluation studies develop; the repercussion of these studies on the improvement of later buildings depends on the extension of their zone of influence or on co-operation with similar bodies established in neighbouring regions.

136. This dynamic certainly seems to be that of development. The results of an initial « exploratory » project — neither pilot nor experimental — can be fed into a growing number of projects, first by simple osmosis and then by organising a feedback process which assumes an evaluation of the first projects and a use of its results in the briefing and design of subsequent projects. Here again, we meet the problem of the scientific character which should be given to the evaluation. The phenomena observed in the functioning of new schools — such as the discrepancy between planned activities and observed activities — cannot be directly or naïvely read off. They must be interpreted with the aid of rigorously handled hypotheses. It has been noted for example, that the evaluation of new schools in Sweden is often assigned to teams of university research workers. In the final analysis, this problem is political: the prospect of development is dependent upon certain choices having been made as regards the extension of the multi-option school. Otherwise, the development processes will prove ineffective or will be obliged to confine themselves to experimentation with no future.

IV. Conclusion: the multiplicity of levels of responsibility

137. The set of constraints (cost limits and norms) which intervene in the elaboration of projects together with the institutional nature of briefing and design groups for multi-option schools involve different but complementary levels of responsibility. Aside from the decision-making mechanisms and the responsibilities of the sponsors, which may vary considerably from country to country, the work of elaboration can be said to involve three levels of decision-making: the local, the regional and the national.

— The first level is that where the schools are to be located and where the users and those providing impetus to the project are to be found. It is at this level that the final consequences of the decisions and compromises that are a feature of the work of elaboration make themselves felt. This

1) Such as those observable at the Collège de Sainte-Maure-de-Touraine (France), paragraphs 19 (c) and 39.

54

local level must therefore be a party to the dialogue and exchanges requisite in this work.

— The national level is of necessity also involved, since it is at this level that the political and financial decisions are taken, these being often decisive to the future of the projects.

— However, it is no doubt at regional level, lying as it does fairly close to local level, that the most fruitful work is likely to be accomplished, at least initially. It is thus at regional level that local situations, despite their differences, can most easily be compared and related to the overall situation at national level. On top of its privileged intermediate positions the regional level has the added advantage of being of the size most conducive to coherent development work.

In order for the projects to have the best chance to develop, structures of dialogue must therefore be set up at all three of these levels.

Can it not also be envisaged that, on the basis of studies of the same type as that covered by the present report, structures of dialogue could be set up at international level not only, as is already the case, for the exchange of information but also to provide an instrument for developing projects of a new type ?

55

Part five:

CASE STUDIES

I. HENRY FANSHAWE SCHOOL, Dronfield (England)

This is a quite meaningful example of adaptation linked to the extension of an already existing school.

Extension. The former school had a capacity of 350 pupils distributed throughout the old building, the former reconverted house of the principal and temporary premises. The new school in its present (phase 1) stage of extension is planned for a capacity of 750 pupils.

Educational reform. The establishment is converted from a grammar school to a comprehensive school designed to enrol 4th, 5th, 6th (and 7th) year pupils undergoing secondary education (14 to 18 year-olds).

Enrolment. The present enrolment structure differs from the one originally intended; the school is still not yet running at full capacity.

	Year Planned enrolment	Current enrolment
4th	330	270
5th	330	210
6th	90	90
7th	—	50
	750	620

At the end of compulsory schooling (16 years, i.e. the end of the 5th year) 55 % of the pupils leave secondary education. An additional 20 % leave at the end of the 6th year. The pupils who continue in the school (6th and 7th years) therefore form the object of an unintentional though true selection which in actual fact already starts when they enter the school (4th year). This shows how hard it is to organise such a school in a truly comprehensive fashion.

TABLE 9:
Plan Analysis of New and Remodelled Buildings
(in m²)

	New school	Sports hall, etc.	Existing school and headmaster's house	Total area	m² per place	Percentage breakdown of total area (excluding Further Education)
Teaching area	2,048	490*	1,050	3,589	3.96	58.19
Teaching storage	149	29	64	242	0.27	3.92
Dining	211	—	—	211	0.23	3.42
Kitchen	162	—	—	162	0.18	2.63
Pupils' cloakrooms, lavatories, etc.	213	109	218	540	0.60	8.75
Staff and administration	210**	44	493	747	0.82	12.11
Circulation	327	36	313	677	0.75	10.98
TOTAL (excluding Further Education)	3,320	708	2,138	6,168	6.81	100.00
Further Education	241	—	—	241	—	—
TOTAL AREA	3,561			6,409		

* Actual area of sports hall: 539 m², calculated at 260 m².
** Including boiler-house, 143 m².

Source : **Design Note 2**, "Henry Fanshawe School, Dronfield, Derbyshire", Department of Education and Science, Architects and Building Branch, HMSO, London, 1969.

Note : As can be seen on plans **1** and **2** below, the extension of the school entails a new architectural layout, the salient features of which are as follows:

— Overall articulation around two central elements designed to play a key role: the social centre, also used as dining hall, and the library.

— Departmentalisation : a set of facilities is earmarked for a given subject or a group of related subjects; within each set or department differentiated areas are provided. In the opinion of those who designed this solution, it represents an intermediate stage whereas the tendency in subsequent projects is towards interpenetration of the facilities of several departments.

1 square metre = 10.76 square feet.

TABLE 10:
Allocation of Time and Work Places by Subject

Phase 1 = 750 pupils.

Subject	a Percentage of time allocated	b Number of pupils working at any one time	c Organisational margin (%)	d Total number of work places
English (grammar, literature, etc.) and languages	22.5	169	10	186
History, Geography, Religious instruction, Commerce	17.5	131	10	144*
Mathematics	12.5	94	10	103
Science	15.0	112	20	134* } 237
Handicrafts, Home economics	10.0	75	30	
Art and crafts	5.0	38	20	
Music	5.0	38	10	
Drama	2.5	19	20	65*
Physical education (excluding games)	5.0	38	10	42
Games and extra-mural activities	5.0	—	—	—
TOTAL	100.0	—	—	817

* These work places relate in particular to optional activities.

Source : **Design Note 2**, op. cit.

Arts and Crafts Centre

The centre is a typical example of how the departmentalisation aspect of the project is dealt with.

— Ease of communication and closeness has been sought with the adjacent science department. Certain rooms (lecture room and small testing laboratory) were also intended to be used jointly for the activities of both departments. In actual practice, the communicating doors between these two departments remain closed all the time, and the common spaces are monopolised by science.

— On the other hand, the department works much more satisfactorily as regards inter-disciplinarity: communication between the various activities is encouraged through the diversified layout and modulation of spaces, ensuring close relationships while at the same time attenuating sources of disturbance.

The projects area is the central part; it acts as a focal point and at the same time makes it possible to allow for unforeseen variations in the relative importance of each of the various activities of the centre, in particular the optional activities (see Table 11).

TABLE 11 :

Breakdown of Choices made in 4th form Optional Subjects

(each pupil chooses 5 subjects)

Subject	Group I	Group II	Group III	Group IV	Group V	Total		Percentage of options chosen
Science (general)	—	11	15	—	—	26		
Earth science	—	19	—	17	—	36		
Chemistry	38	—	24	22	—	84		
Physics	—	—	22	26	40	88		
Biology	24	24	20	24	24	116		
Geology	12	—	15	—	—	27		
TOTAL SCIENCE							377	28.0
History	53	21	—	56	—	130		
Geography	—	54	—	45	47	146		
Social studies	—	8	15	11	11	45		
Money management	—	—	—	—	20	20		
Religious knowledge	—	7	—	—	—	7		
TOTAL ECONOMIC AND SOCIAL SCIENCES							348	26.0
German	14	—	10	—	—	24		
French	—	47	10	—	27	84		
TOTAL LANGUAGES							108	8.0
Commerce	—	—	18	9	—	27		
Accounts	21	—	—	—	—	21		
Office practice	18	—	—	—	—	18		
Typewriting	—	—	—	18	17	35		
TOTAL COMMERCIAL SUBJECTS							101	7.5
Art	24	22	42	—	15	103		
Music	—	—	—	3	8	11		
Craft	30	—	16	14	8	68		
TOTAL ARTS							182	13.5
Rural science	—	—	21	—	—	21		
Domestic science	—	18	27	—	17	62		
Needlework	18	14	—	—	—	32		
Woodwork	19	—	—	—	18	37		
Metalwork	—	—	16	—	19	35		
Technical drawing	—	20	—	20	—	40		
TOTAL PRACTICAL SUBJECTS							227	17.0
GRAND TOTAL	271	265	271	265	271	—		100.0

Source : Internal document of the school.

Note for tables 10 and 11

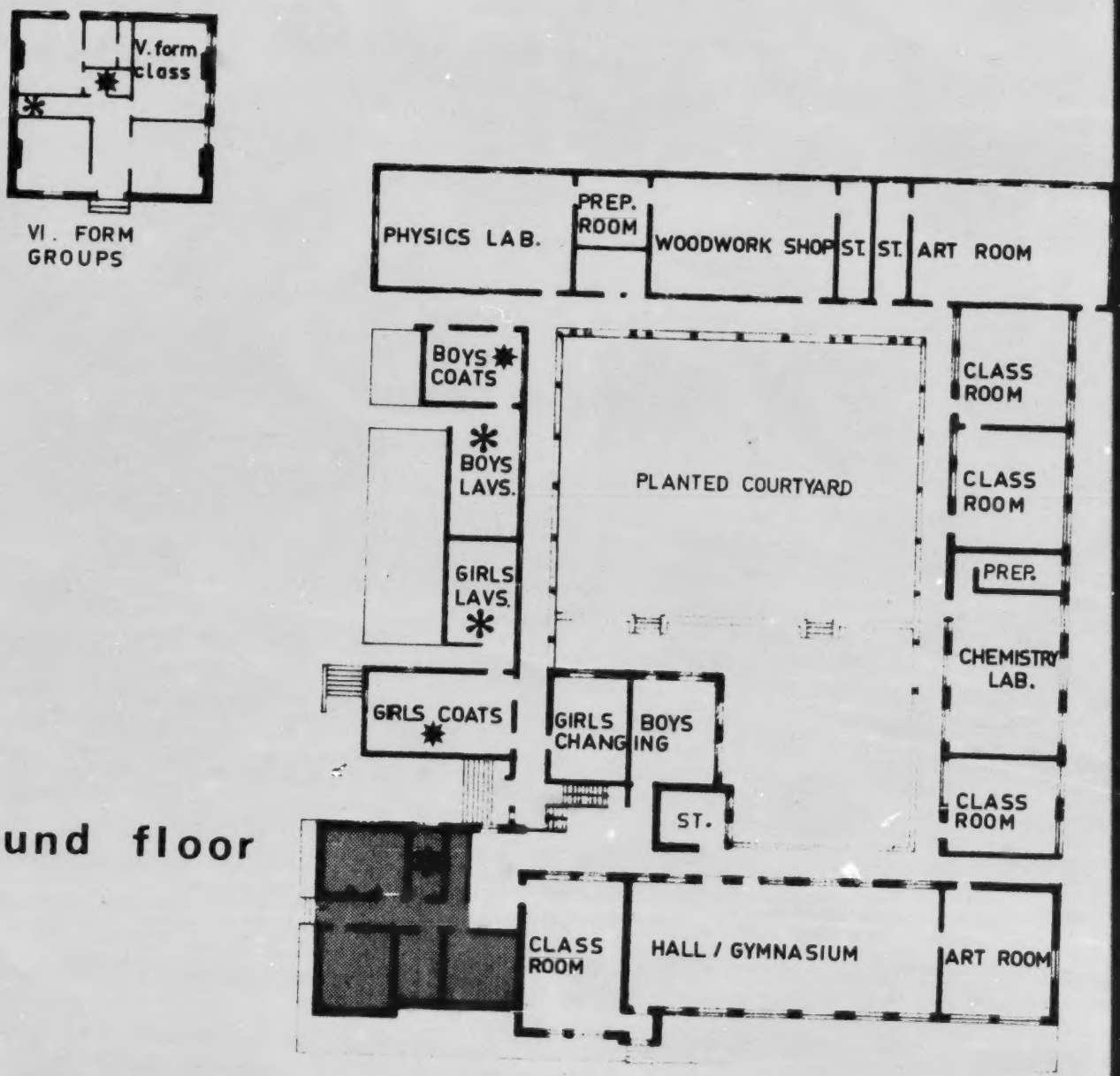
The pupils in the 4th and 5th years follow a curriculum of five compulsory subjects: mother tongue, mathematics, religious instruction, physical education and sports, as well as a programme of optional subjects: five options to be chosen from a very wide range (see Table 11).

The estimates concerning the number of work places needed per subject or group of subjects were based on a complex model of timetabling incorporating the likely distribution of the pupils amongst the optional subjects. The purpose of the margins (col. *c*) added to the theoretical number of work places needed (col. *b*) is to provide a certain degree of flexibility in timetabling. It is for the same reason that several related subjects have been grouped together and allocated the same batch of working places.

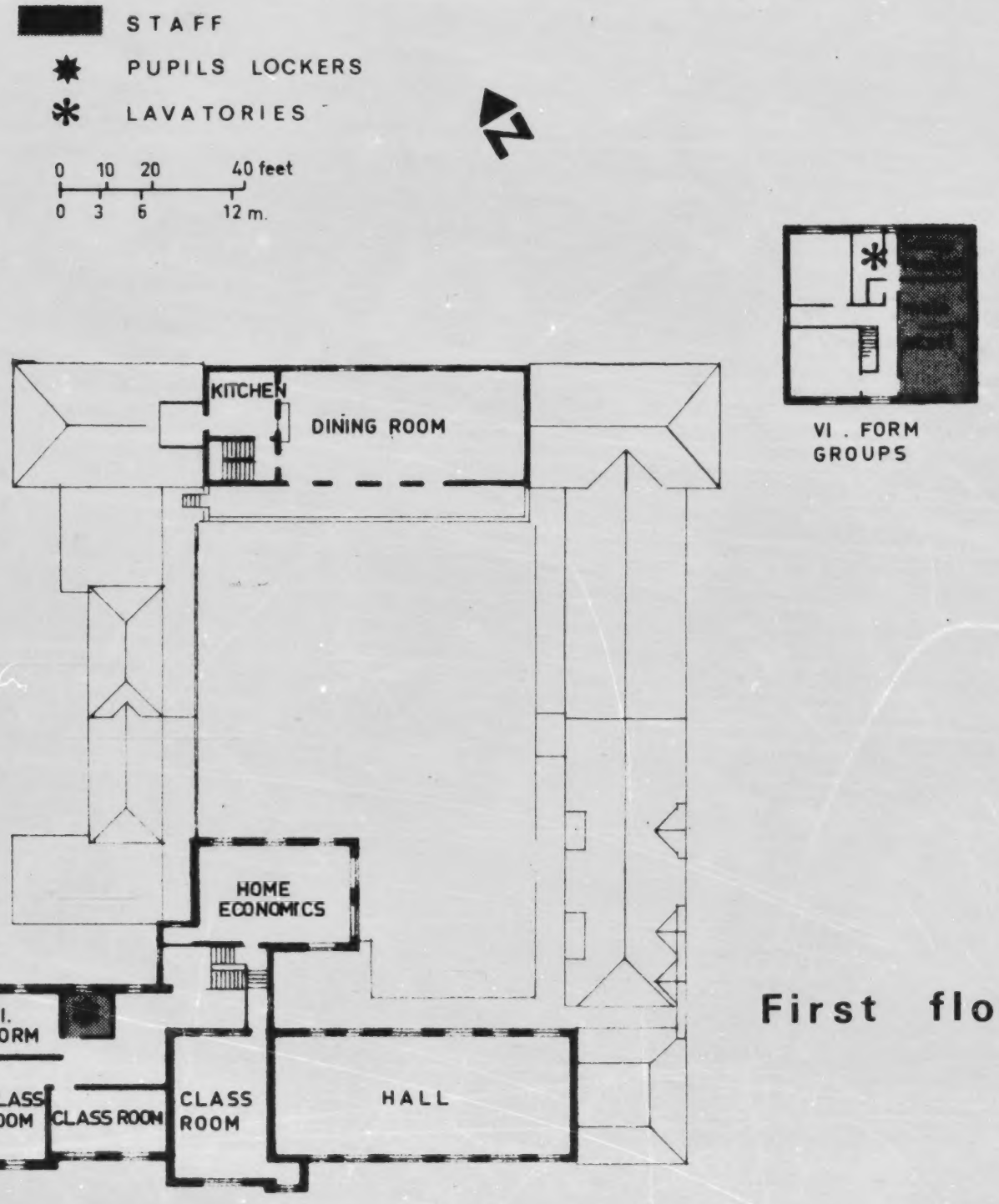
This flexibility is rendered even more necessary by the fact that actual practice has shown that the optional subjects chosen by the pupils have turned out to be different from what was expected when the brief was originally drawn up on the basis of previous experience from similar schools. Table 11 shows the pattern of choice of options for one year. However, since this pattern concerns only one year out of the total of four, no hard-and-fast comparison can be made between the breakdown of requirements as they stem from these choices and the distribution of the places available. However, as the observation confirmed, it can be seen that it is harder to satisfy the requirements in economic and social sciences, in commercial subjects or again in science, than it is in arts and crafts.

HENRY FANSHAWE SCHOOL (England)

Existing accommodation before extension and adaptation. Plan I

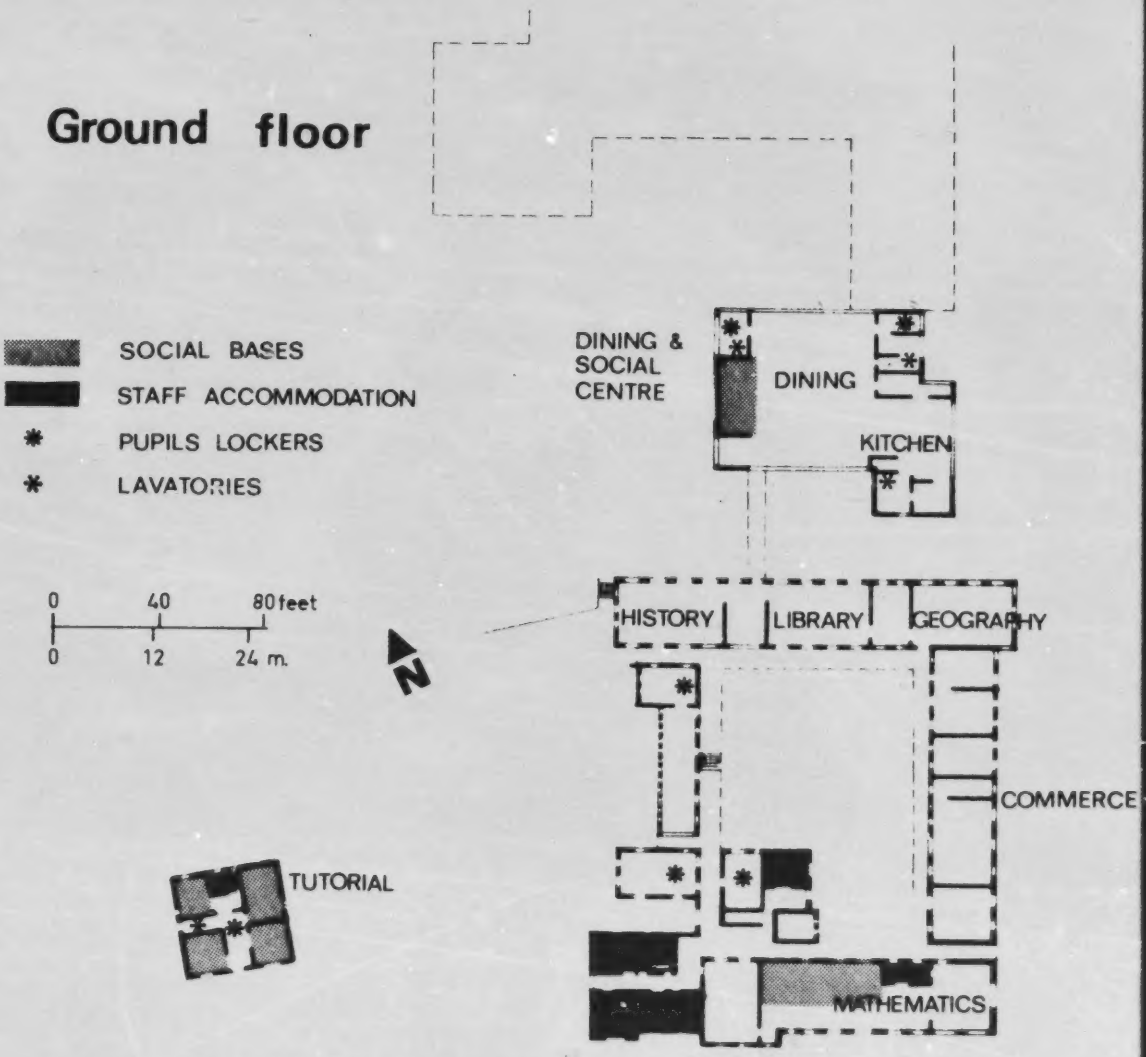


Ground floor

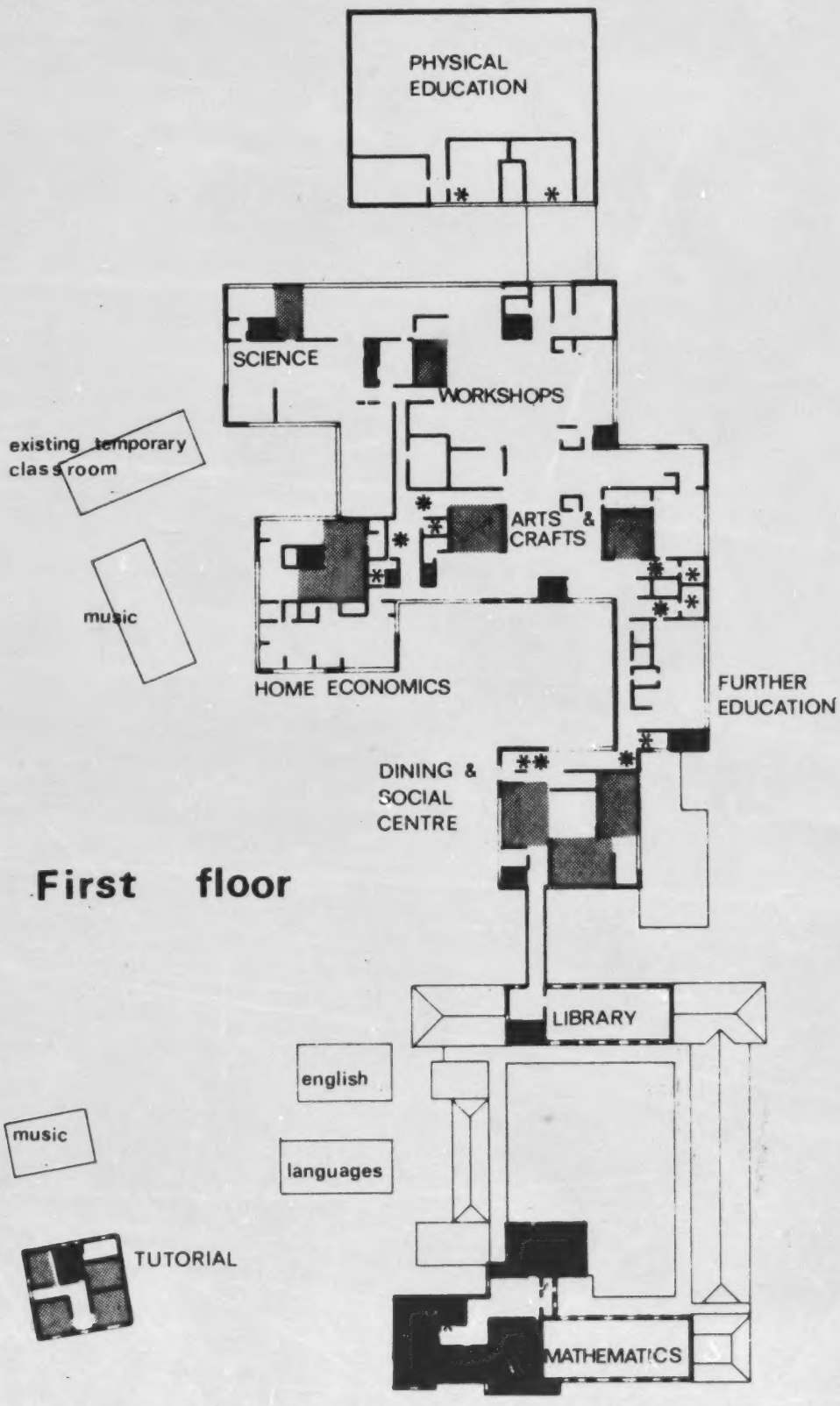

STAFF
PUPILS LOCKERS
LAVATORIES
0 10 20 40 feet
0 3 6 12 m.
N
VI . FORM GROUPS
KITCHEN
DINING ROOM
HOME ECONOMICS
VI. FORM
CLASS ROOM
CLASS ROOM
CLASS ROOM
HALL
First floor

HENRY FANSHAWE SCHOOL (England)

SUBJECT DEPARTMENTS & SOCIAL BASES . Plan 2



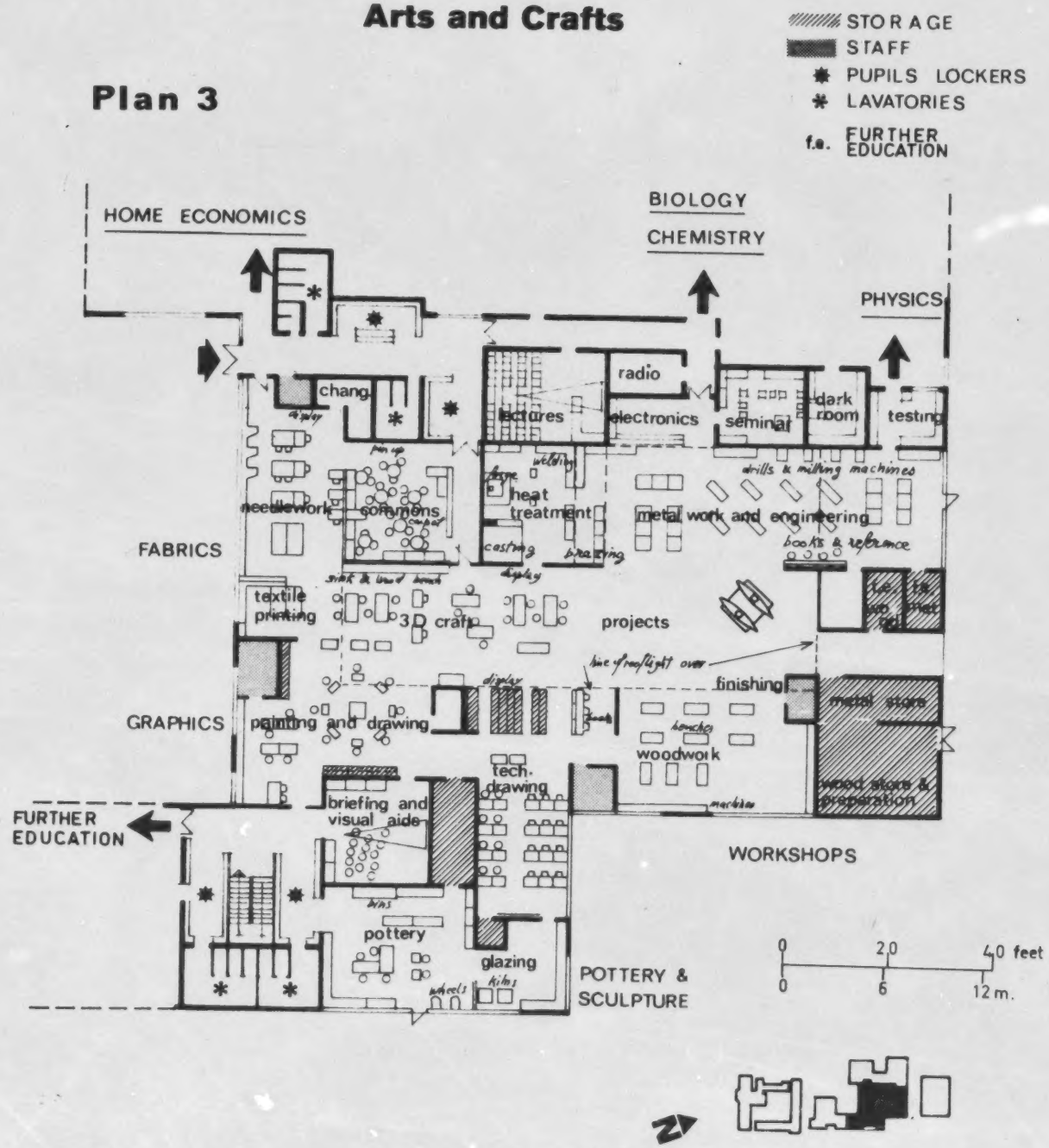
Social bases. These consist of spaces that are more comfortably furnished than other spaces, and which are intended to accommodate groups of pupils during non-working hours. These spaces are not set aside exclusively for this purpose, but can also be used as working areas (for teaching or studying). A typical feature of the project is the scattered location of these spaces (apart from some concentration in the social centre) and their integration into each individual department. In principle, these spaces are not intended to be taken over by groups or individuals for whom lockers are provided in the cloakrooms; in actual practice, they provide primarily a break from studies and short periods of relaxation. Spaces that can be taken over by groups of pupils in the 6th and 7th years have been provided in the reconverted house (see Tutorial). The pupils in the lower classes have taken over the various areas set aside for social activities practically spontaneously, as well as other spaces not planned for this use.



HENRY FANSHAWE SCHOOL (England)

Arts and Crafts

Plan 3



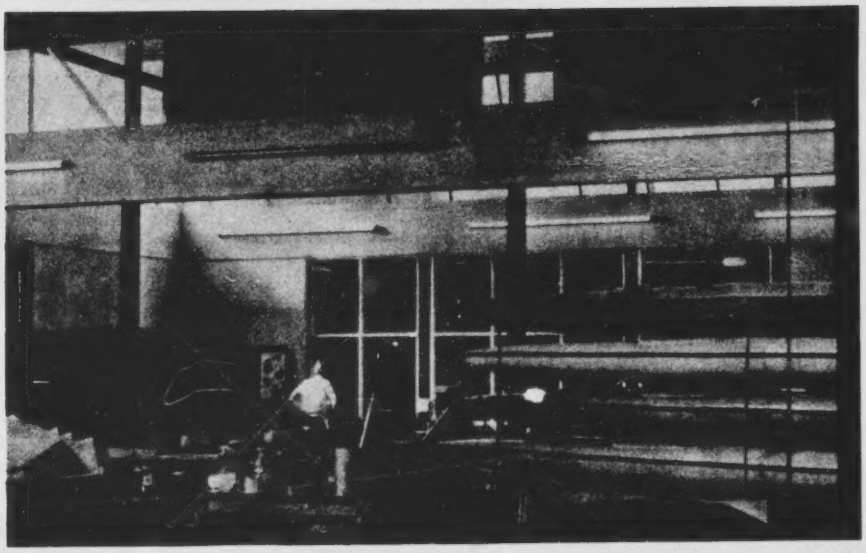
Graphics area and workshops

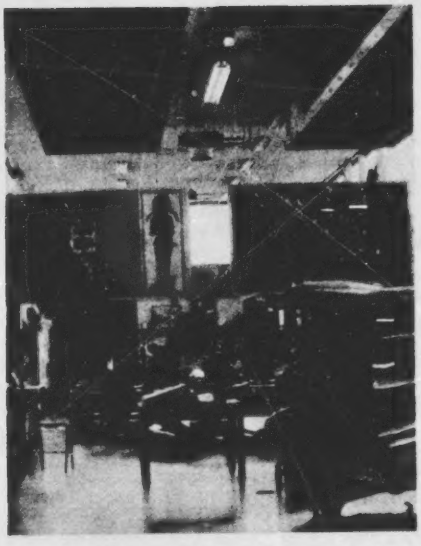
24. The canoes that can be seen on the photograph are also shown on the plan; they enable the reader to situate the various parts of the centre on the other photographs. These various parts converge towards the central projects area where these canoes are to be found.

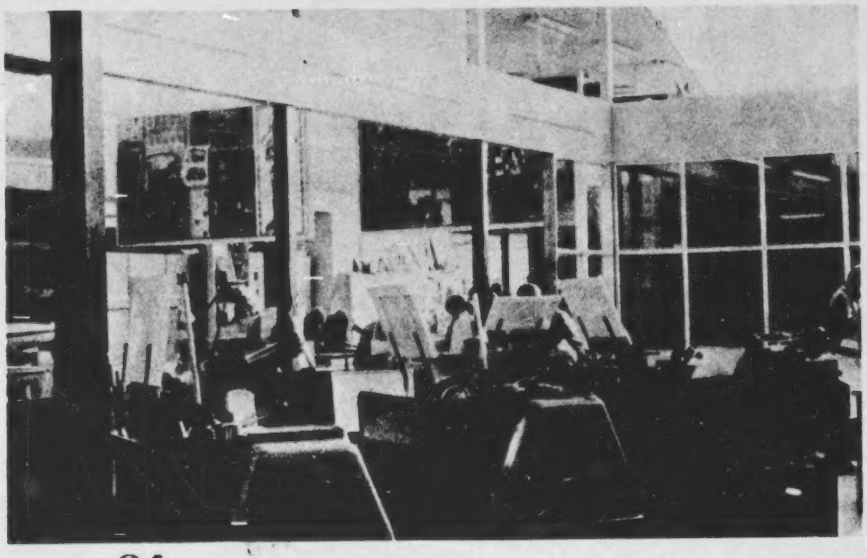
25. The painting and drawing area. Idem.

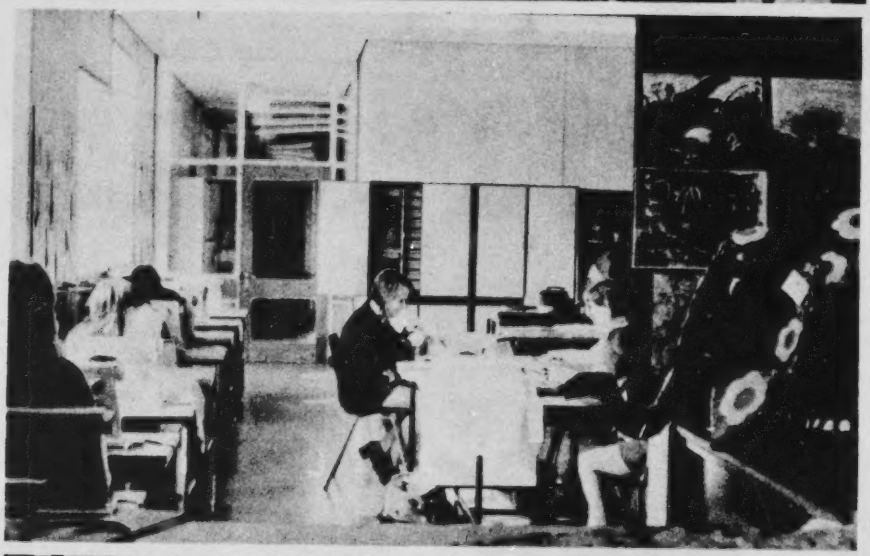
26. The woodwork area. The technical workshops extend from the painting and drawing area.

27. The metal work area. The technical equipment is of a high quality for a school which does not have vocational training as an objective.



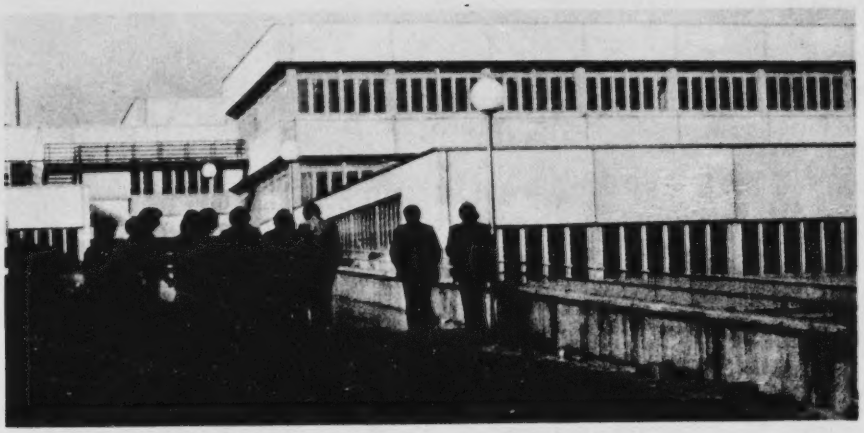






Fabrics area

28, 29, 30. This area which forms part of the Arts and Crafts Centre has been conceived as an entity, i.e. without partitions, and is located along the external wall which provides the best lighting. There are specific workplaces for each of the various activities but according to need these frequently overlap. The area opens up onto other areas equiped for complementary activities (drawing, painting, model making) and has easy access to the home economics department.



31. General View of the School.

II. GESAMTSCHULE FRONDENBERG, (Germany)

TABLE 12:
Basic Programme. Projected Breakdown of Useful Areas

Department	Area in m²	
1. Languages	1,321	
2. German and social sciences	2,140	
3. Mathematics, science and technology	1,626	
4. Workshops	1,109	
5. Music and drama	396	
7. Library	953	
8. Administration	289	
9.1. Information hall	330	
First sub-total (1)		8,164
6. Sports	2,354	
9.2. Leisure area	900	
10. Dining hall	650	
Second sub-total		3,904
Grand total		12,068

(1) It is this total which corresponds to the limits of floor area determined by the three conjugated programmes (Realschule + Hauptschule + Gymnasium).

Background and basic educational principles

The comprehensive school of Fröndenberg is located in a mainly residential semi-rural area fairly close to Dortmund (Germany). The initiative for this project was taken by the municipality of Fröndenberg; this municipality, which covers a broad area, wished to offer all its young people the possibility of undergoing within its boundaries all forms of secondary education then existing in the *Land* of Nordrhein-Westfalen. At the same time, it seemed convenient to regroup pupils from a number of secondary schools, difficult to operate because of their small size and which in any case were scheduled for replacement by a single school. Finally, this local initiative tied in with the plans to restructure secondary education which were being prepared by the Ministry of Education of the *Land*.

Fröndenberg secondary school has a considerable enrolment capacity — it is planned for 1,800 pupils, but enrolments are even expected to exceed this figure (2,000 pupils in 1976). The basic educational approach adopted is that of the integrated comprehensive school *(Integrierte Gesamtschule)*, in which the usual three streams of secondary education are replaced by a single system of education; the *Gesamtschule* replaces the complementary post-primary courses *(Hauptschule)* and the junior modern school *(Realschule)* which already existed in the municipality, as well as the grammar school *(Gymnasium)* which it would have been necessary to create in order to offer a complete range of secondary schooling.

As stated in paragraph 16 (a), this type of school enrols all children of the same age-group in a given territorial sector, with the aim of giving them a common education.

Another important innovation characterises this type of school: it is a « whole-day » school; the school day consists of nine 45 minute periods, whereas in the former secondary school it ended by about 1 o'clock in the afternoon. This innovation is expected to reduce the dependency of the child on its family environment, thus contributing to equalising educational opportunity.

The *Gesamtschule*, which is as yet unevenly introduced in the various German *Länder*, has since 1969 been the subject of particular attention on the part of the Ministry of Education of Nordrhein-Westfalen, which has initiated an experimental programme of twenty schools.

The Fröndenberg municipality has adopted this new type of education for its one and only secondary school. The school is located on a steep hill at the geographical centre of the municipality not far from the main built-up area.

The building programme, which was financed just about equally by the *Land*

and the local community, is defined as the equivalent of three conjugated programmes: that of a complementary post-primary course *(Hauptschule)* with three parallel classes (« three-entry »), that of a « two-entry » junior modern school *(Realschule)* and finally of a « three-entry » grammar school *(Gymnasium)*. This expedient made it possible to refer to known norms, in the absence of appropriate norms for this new type of school.

The limits of floor area thus determined were interpreted on the basis of a theoretical model developed by a local group. Right from the outset, the principle of a higher total cost was accepted, owing to the innovative nature of the facilities needed. Initially set at 20 per cent of the basic cost, the additional expenditure finally appears to be considerably greater.

32. An overcrowded laboratory.

Design

The facilities were designed to match the initial educational options made as closely as possible.

« The principle behind the comprehensive school is to educate children in a differentiated system of courses, which only at a late stage lead to a choice between different specialisations in the overall type of education the child is to have. The stress is on individual needs and the fostering of talents, remedial education, and compensatory education for socially underprivileged children. » (1)

The first projection of this principle gave rise to an overall conceptual model (see the functional diagram opposite) the main characteristics of which are as follows:

— a concentric structure with the common centre, the core of the school, consisting of the library (resource centre), the large information and drama hall, the dining facilities and the administration area;
— departmentalisation (2): areas have been earmarked around the central core for sets of subjects (see table 14).

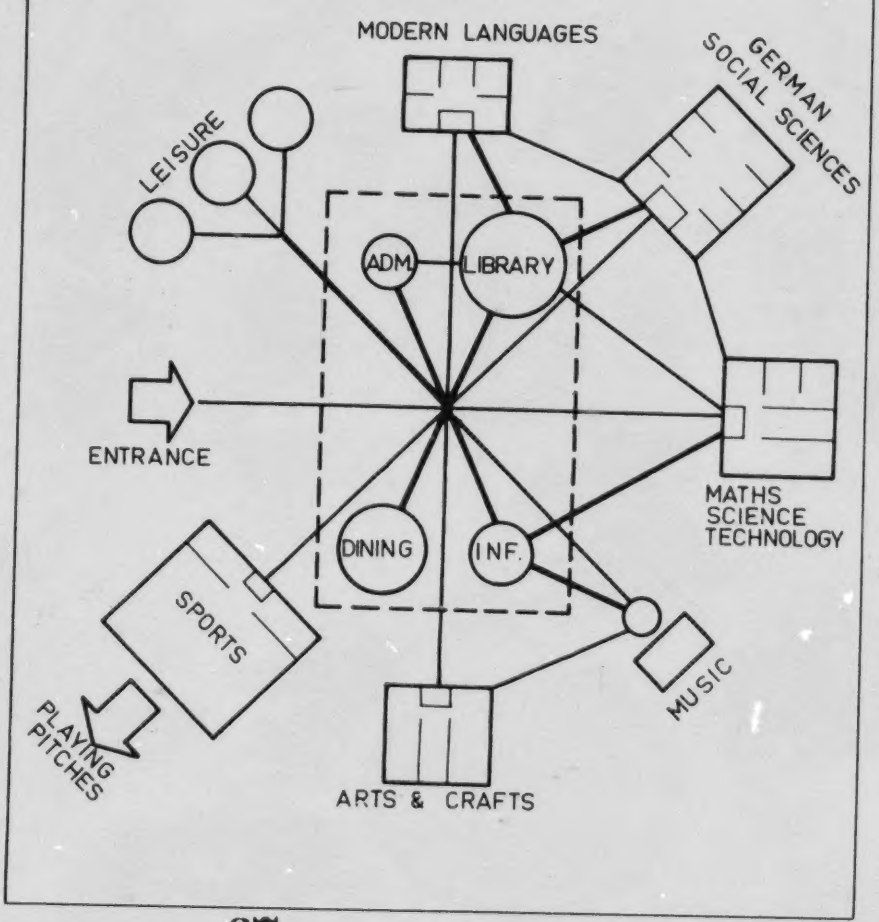
The second projection of the basic principle was much more specific and proceeded from two concepts:

— differentiation in education (3);
— team teaching, i.e. team work by the teachers and joint planning of activities.

In terms of the organisation of work the application of these concepts result in the introduction of teaching units, an example of which is shown graphically in the following diagram (figure 6).

FIGURE 5

GESAMTSCHULE FRÖNDENBERG : Functional diagram



1) **Innovation in Education - Germany.** Technical report, Centre for Educational Research and Innovation, OECD, Paris, 1971, page 37.
2) Paragraphs 70 to 76.
3) Paragraphs 41 and 42.

The principle behind these teaching units is explained in paragraph 88 (b). The contents of each unit consist of common elements *(fundamentum)* and additional elements *(addendum)*; the groups and sub-groups are differentiated according to rate of assimilation and level of learning objectives. The implementation of a given teaching unit involves a large group of pupils (about 105); often, the activities which form part of the « initial test » phase include a period of collective information which precedes the actual test. During the differentiated assimilation stage, the groups and sub-groups work independently; they can join together when their objectives converge; they can also switch when their objectives change.

From the point of view of space, the facilities have been conceived to fit this general principle in two ways (1):

— For general subjects (mainly mathematics and the mother tongue): differentiation of activities within one common space, the use of which varies in the course of one and the same teaching unit. This is how the large rooms *(Grossräume)* which form the basis of the architectural concept of the school, operate. In each of these rooms, a group of children (105) works with three teachers in turn in one large group or in differentiated groups (as a rule three, within which sub-groups are then formed).

— For scientific subjects: distribution of the differentiated groups amongst small rooms (laboratories), before or after large group sessions which take place in a big information room (2). The difficulties arising from the use of these spaces, are mentioned in paragraph 43 and illustrated below.

The above principles do not apply to a number of activities, mainly:

— those which, by their very nature, take place in medium-size heterogeneous groups: workshop activities, arts, *Arbeitslehre* (3), and religious instruction (which at Fröndenberg is very close to the social sciences);

— those where it does not appear possible or desirable to apply the approach outlined above, the main case being foreign languages in which « class » groups are organised on the basis of performance with no more than formal reference to the group as a whole.

From the standpoint of facilities, the following can be noted:

— the organisational system adopted is disrupted by the lack of coherence in teaching methods; this is particularly noticeable as regards languages, where the available areas in the *Grossraume* have been split up to create conventional classrooms of the enclosed type. Even when movable partitions have been used, this division into classrooms is permanently maintained.

— there are no suitable areas for activities by medium-size heterogeneous groups. Groups of this size operating on the principle of teamwork have no room which is really suitable for discussion. For instance, Table 14 shows that the activity « religious instruction » is organised in several places (five) none of which is suited for this purpose. The photograph above illustrates this lack of activity facility matching which the freer use of space can help to compensate.

33. A religious instruction class has left the room allocated to it to re-organise itself on a carpeted area intended for circulation and social activities.

The « Grossraum »

This type of facility represents the true originality of the Fröndenberg school. The attention of all those involved in the briefing and design, both architects and educationists has been centred on the *Grossraum* concept which has given rise to much contention and led to considerable extra costs, particularly as regards its acoustical treatment.

The concept of the *Grossraum* is set forth in paragraph 43 and summarised above. Intended, like the open area to permit a wide variety of working methods within a single space, it nonetheless differs from the open area in several respects:

— the non-differentiation of the internal layout: for instance, the basic furnishings consist of tables and chairs;

— the lack of a small resource centre; the large resource centre which groups all the various teaching aids lies outside the *Grossraum* — despite its nearness, it is not adjacent to the teaching areas.

The basic structure of the *Grossraum* is a square of 16.80 m x 16.80 m (or in other words 4 x 4 grids measuring 4.2 m along the sides), and the span required is thus unusually large.

The area of the *Grossraum* is about 250 m2. Although basically of the same type, they vary in shape according to whether they have been encroached upon either on one of the corners or on one of the sides (by numerous small workrooms, mainly used for concentation between teachers). The former shape is more conducive to large group instruction around a central point occupied by the teacher during the information phase of the work. The latter shape is more suitable for the organisation of work in medium-size sub-groups, and it is this type which is most frequently used for teaching mathematics.

The following diagram shows two examples of how a *Grossraum* of the first type can be used and one example of use of the second.

1) This therefore makes it possible to qualify what was said in paragraphs 34 (a), 44 and 45, which should be consulted for a more general explanation.
2) See note (2) of table 14.
3) Practical study of contemporary society.

FIGURE 6

GESAMTSCHULE FRÖNDENBERG : DIAGRAMMATIC PRESENTATION OF A LONG WORK SEQUENCE (Teaching unit)

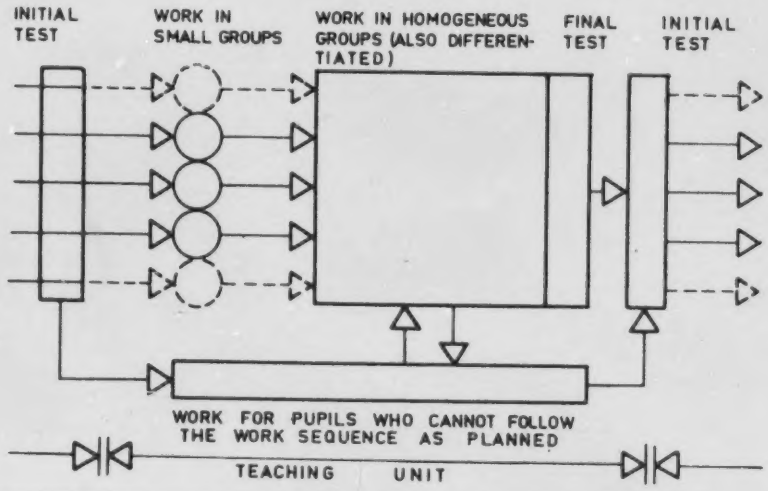

INITIAL TEST
WORK IN SMALL GROUPS
WORK IN HOMOGENEOUS GROUPS (ALSO DIFFERENTIATED)
FINAL TEST
INITIAL TEST
WORK FOR PUPILS WHO CANNOT FOLLOW THE WORK SEQUENCE AS PLANNED
TEACHING UNIT

TABLE 13:
Time Allocated by Subject and Option according to School Year as Planned (a) and as Implemented in 1972-73 (b)
(one unit = a period of 40 or 45 minutes)

	5		6		7		8		9 (2)	10 (2)
Compulsory subjects	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(a)
Mother tongue	5	5	5	5	4	4	4	4	4	4
English	6	6	6	6	4	4	4	4	4	4
Mathematics	6	6	6	6	4	4	4	4	4	4
Science	5	5	5	5	5	5	4	4	4	4
Social Sciences	4	4	4	4	4	4	3	3	3	3
Arbeitslehre	2	2	2	2	2	2	—	—	—	—
Religious Instruction	2	2	2	2	2	2	2	2	2	2
Sports	2	3	2	3	2	2	2	2	2	2
Arts	2	2	2	2	2	2	2	2	2	2
Music (1)	1	1	1	1	1	1	1	1	—	—
TOTAL	35	36	35	36	30	30	26	26	25	25
OPTION: Languages French or German (practice) or English + German (support)	—	—	—	—	4	4	4	4		
OPTION: Mathematics Maths 1 (supplementary course) or Maths 2 (reinforcement) or Applied Mathematics	—	—	—	—	4	2	4	2	4	4
OPTION: Contemporary life Technology, Economics or Science In addition (not planned): History, Geography	—	—	—	—	—	—	4	2	4	4
OPTION: Free activities **planned:** sports, gymnastics, arts, technical work, music, drama, free activities, German, Latin **implemented:** sports, typing, religious instruction, technical work, music (playing an instrument), biology and physics, cooking and pupils' magazine	3	—	3	—	2	—	3	2	4	4
Independent work	1	—	1	—	1	—	1	—		
Tutorial	1	1	1	1	1	1	1	1	1	1
TOTAL	41	37	41	37	41	37	41	37	41	41

(1) Since no qualified teacher was available, this activity could not be started.
(2) The columns for the 9th and 10th years are shaded since enrolment for these years was not yet open in 1972-1973.

Source : Internal document of the school.

As indicated in paragraph 44, there are limits to the flexibility in use of the *Grossraum* and one may ask oneself whether these are inherent in the organisational system itself or result from difficulties in finding suitable solutions to its internal layout, particularly as regards the creation of an environment conducive to widely differing forms of work. For instance, despite the attention given to its acoustic treatment, it has apparently not proved possible to overcome the difficulties of making this space suitable for both large- medium- and small-group activities. In the first type of *Grossraum*, an electronic amplification system had to be installed.

Nonetheless, the Fröndenberg teachers remain strongly in favour of this spatial solution. Among other things, they stress the advantages which the large area offers for dealing with differentiated groups; it makes it possible to distribute the pupils into groups independently of the nature and shape of the space (see paragraph 43) and hence to tie this distribution more closely to teaching/learning requirements; likewise, it makes for greater interflow between the groups, whereas work in separate classrooms tends to immobilise the « setting »; the difference in this respect between the teaching of the mother tongue and that of foreign languages, which is practiced in the conventional type of classroom (see above) is a clear illustration of this.

The Resource Centre

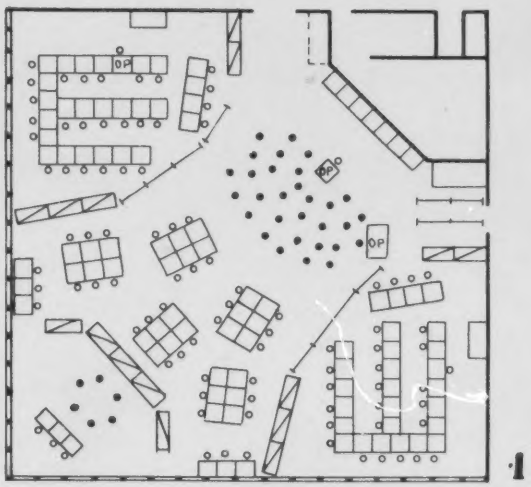
It did not prove possible to check by observation the key position of the resource centre in the school since it was not completed and uncertainties still prevailed amongst the teachers as to its equipment and use.

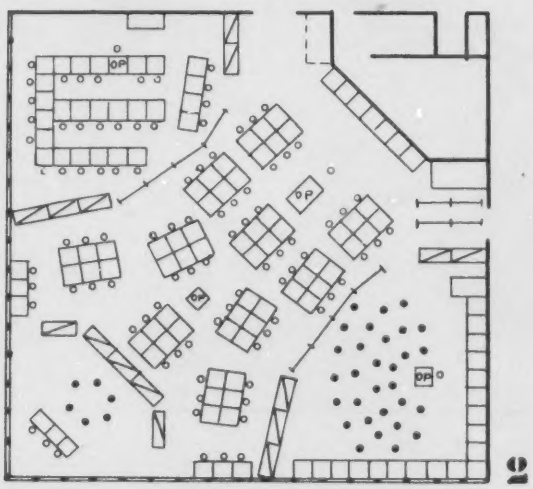
This square space, generously dimensioned (33.60 m x 33.60 m, i.e. 8 x 8 grids measuring along the sides 4.20 m) lies halfway between the two floors containing the other teaching areas which it therefore serves equally. It is covered and as it were springs out of a self-supporting metal lattice structure resting on four pillars in a median position (forming a square measuring 16.80 m along each side) — see photograph 36.

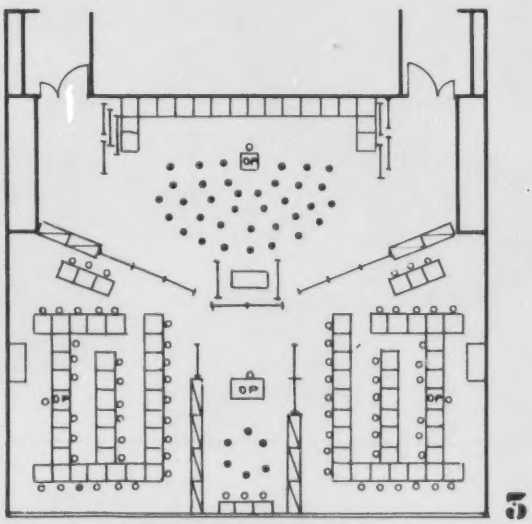
FIGURE 7

USE OF THE "GROSSRAUM"

- TABLE
- TABLE
- MOBILE UNIT
- MOBILE PANEL
- CHAIR
- LECTURE CHAIR
- O.P. OVERHEAD PROJECTOR



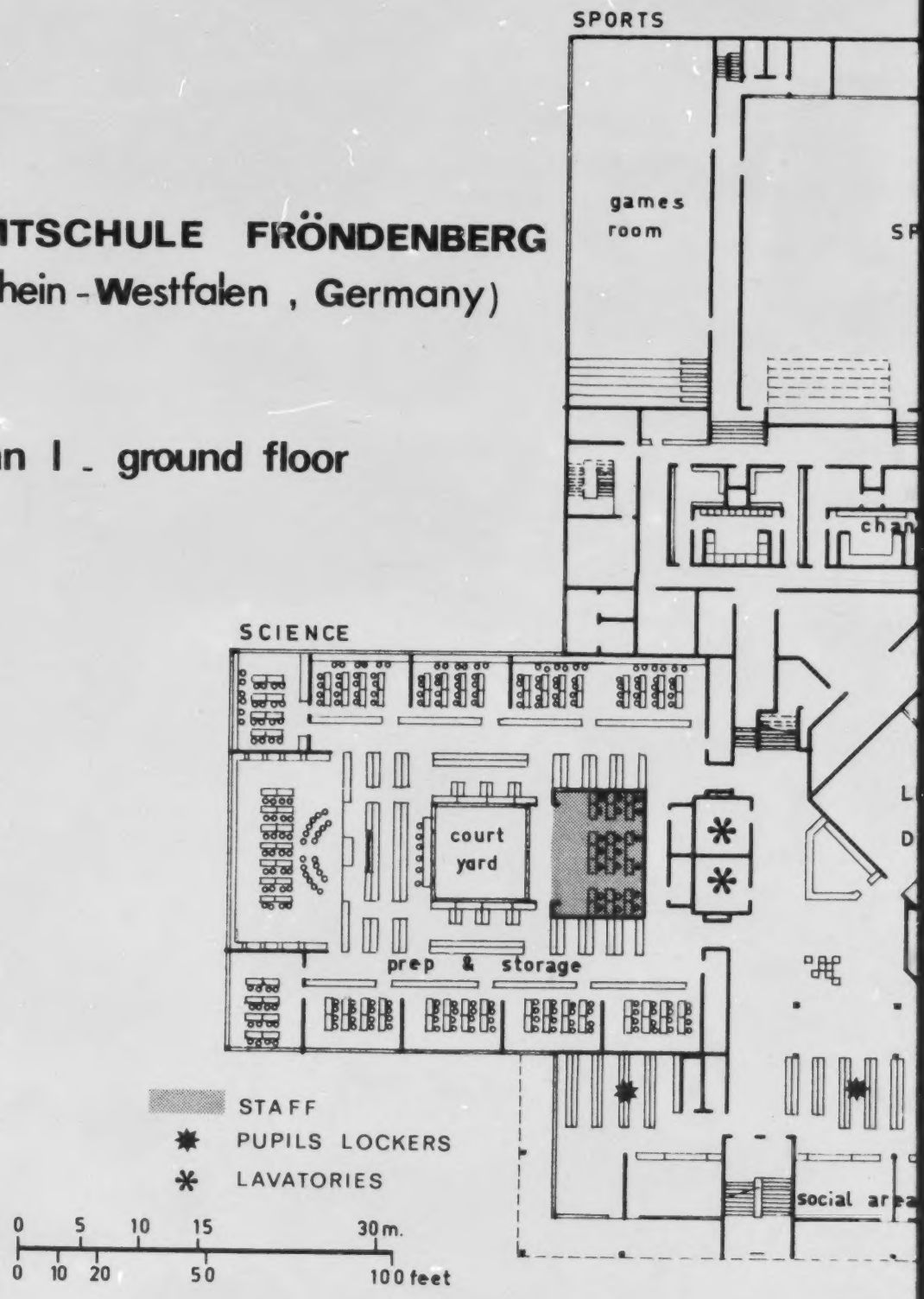


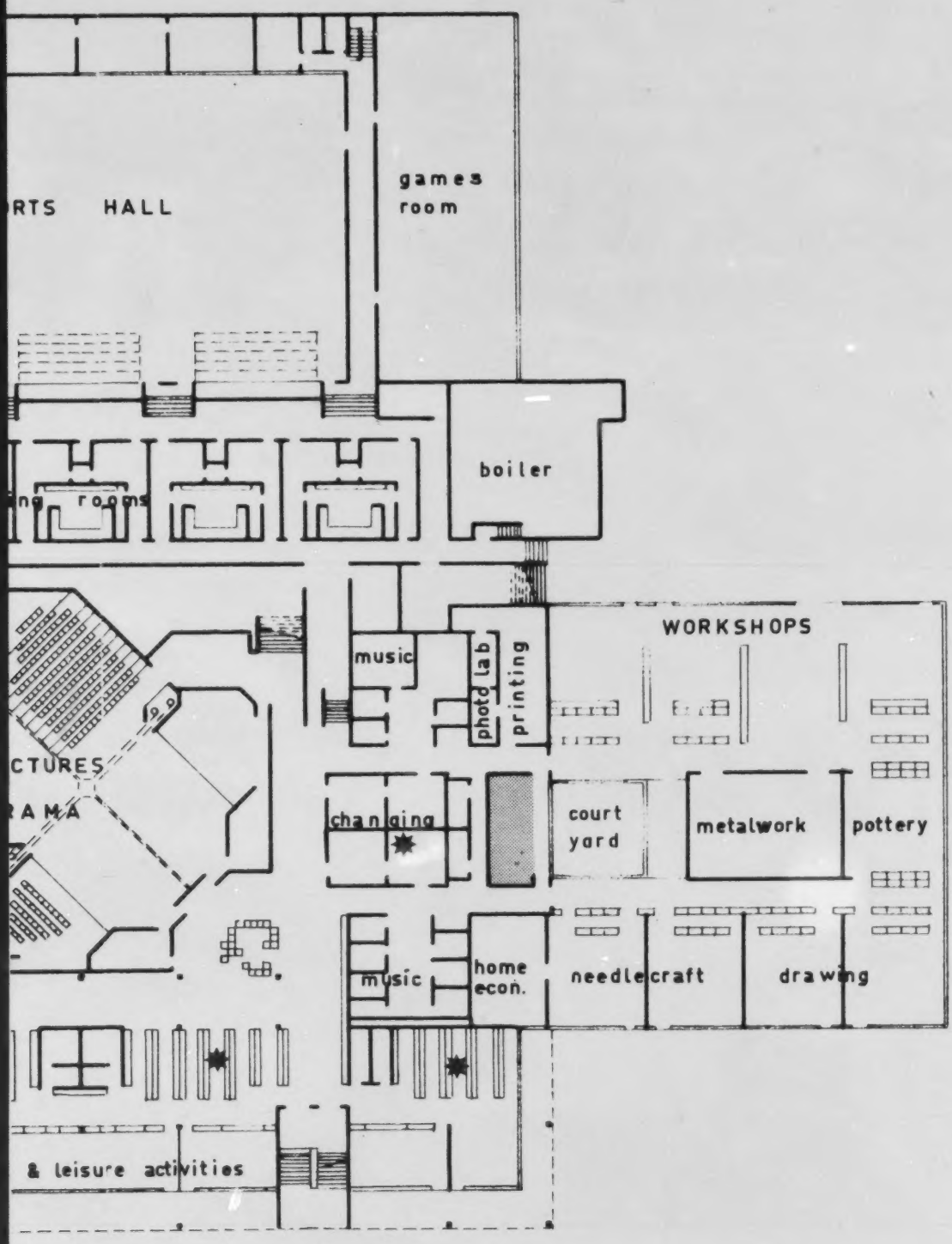


GESAMTSCHULE FRÖNDENBERG

(Nordrhein - Westfalen , Germany)

Plan I . ground floor

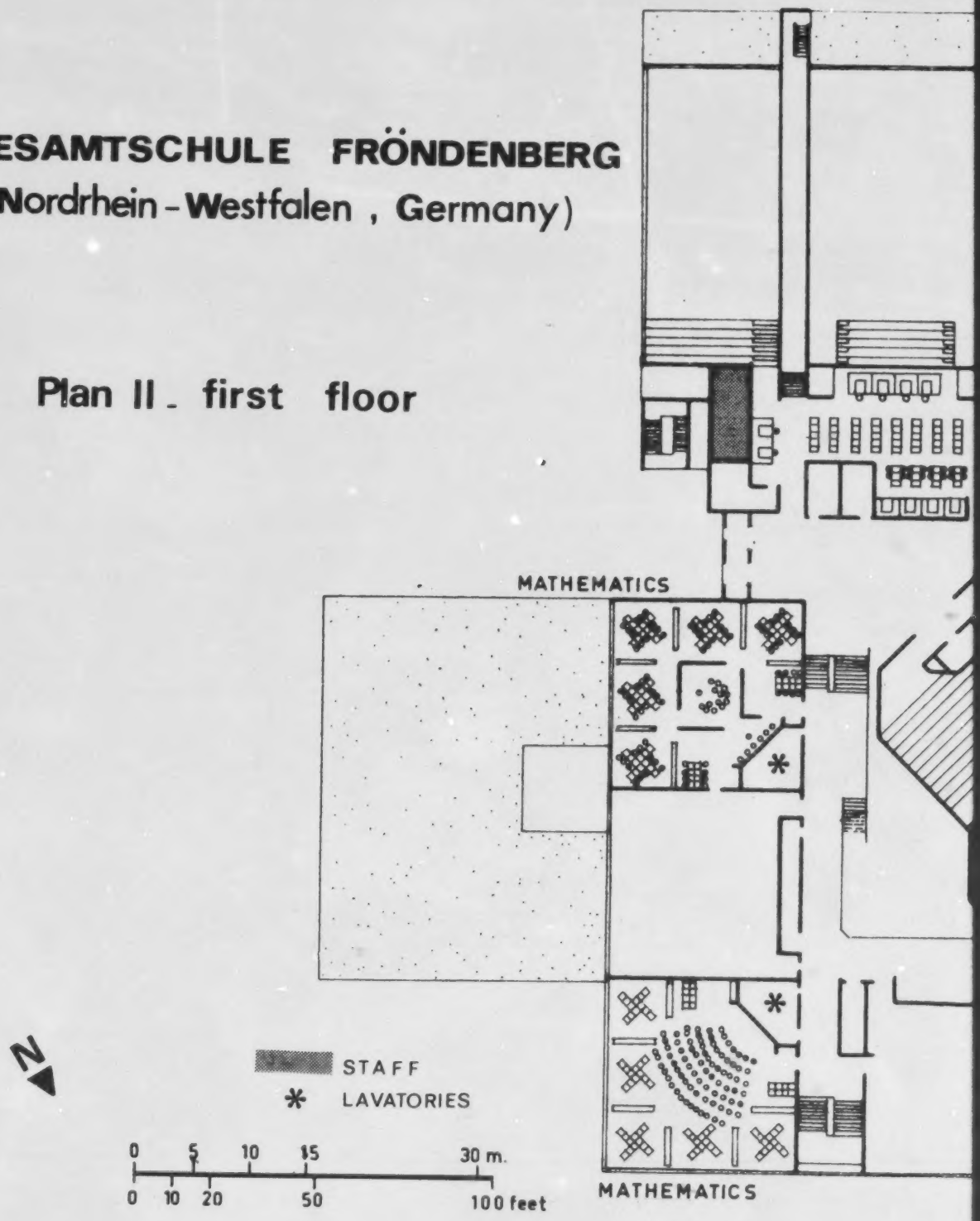



games
room
boiler
rooms
WORKSHOPS
music
photo lab
printing
court
yard
metalwork
pottery
changing
music
home
econ.
needlecraft
drawing
& leisure activities

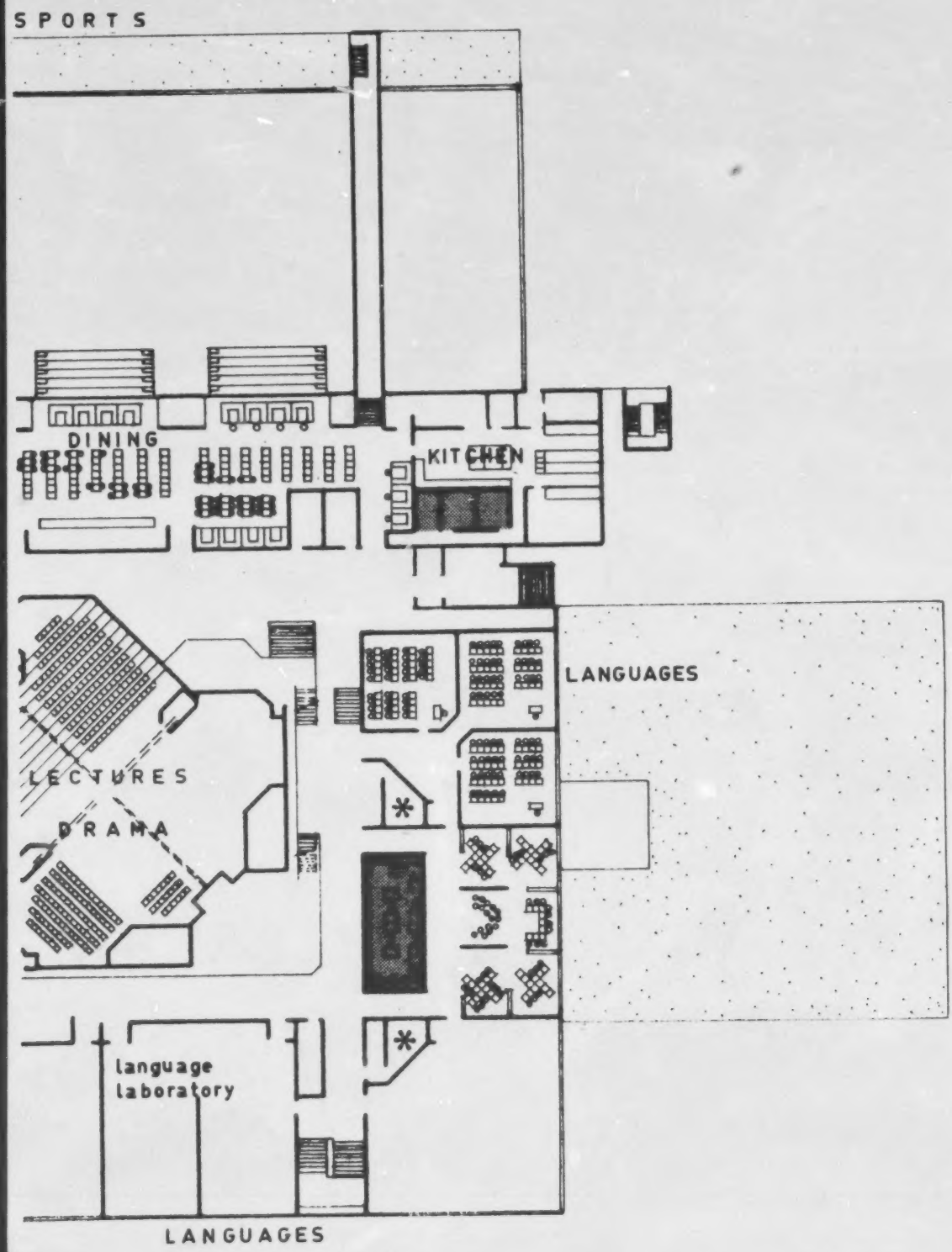
GESAMTSCHULE FRÖNDENBERG

(Nordrhein - Westfalen , Germany)

Plan II - first floor



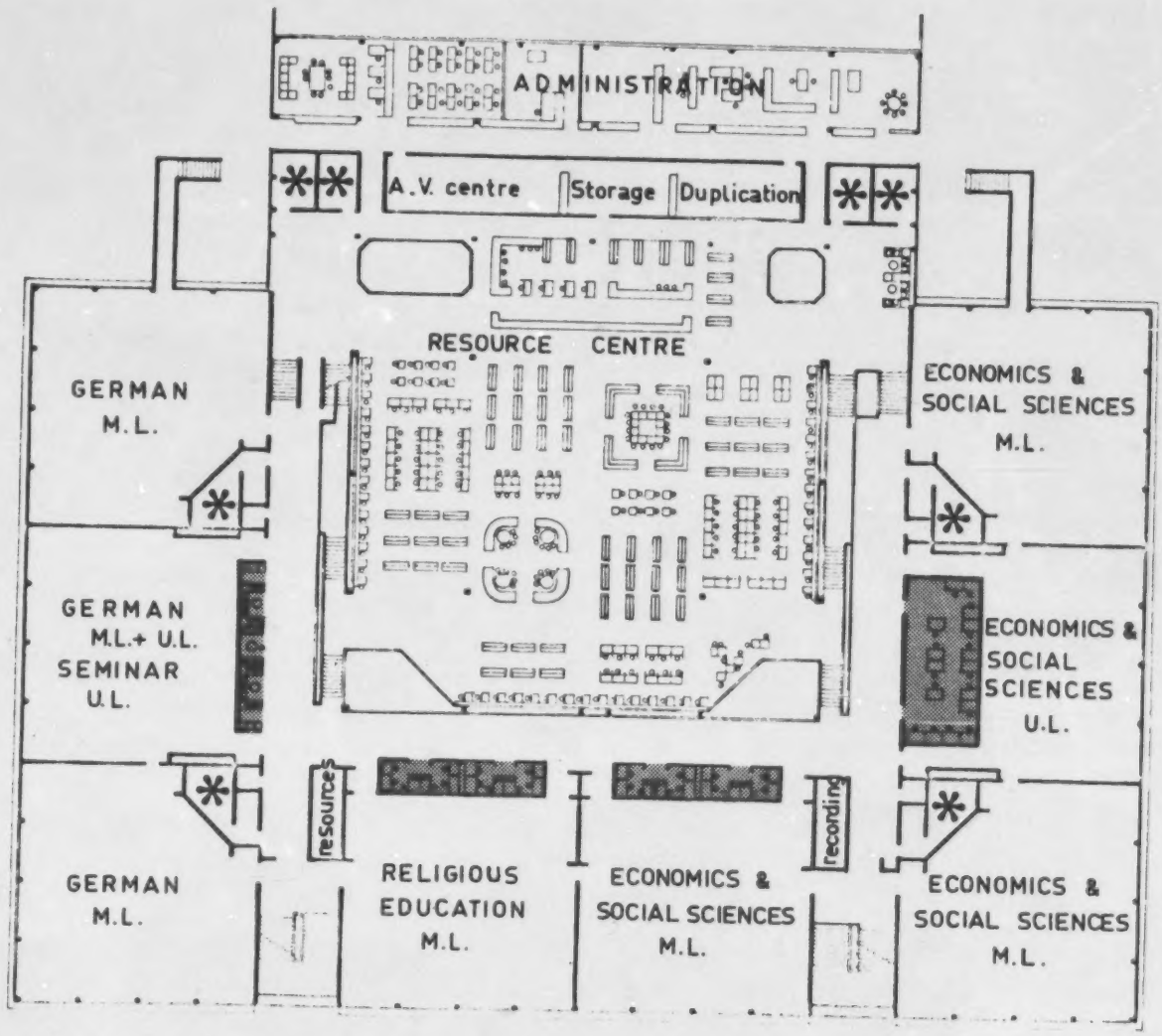
74


SPORTS
DINING
KITCHEN
LANGUAGES
LECTURES
DRAMA
language
laboratory
LANGUAGES

GESAMTSCHULE FRÖNDENBERG

(Nordrhein-Westfalen, Germany)

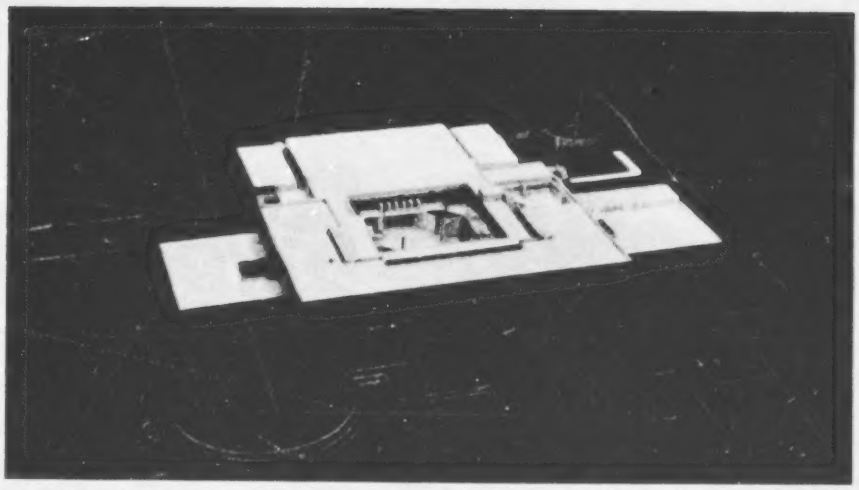
Plan III second floor

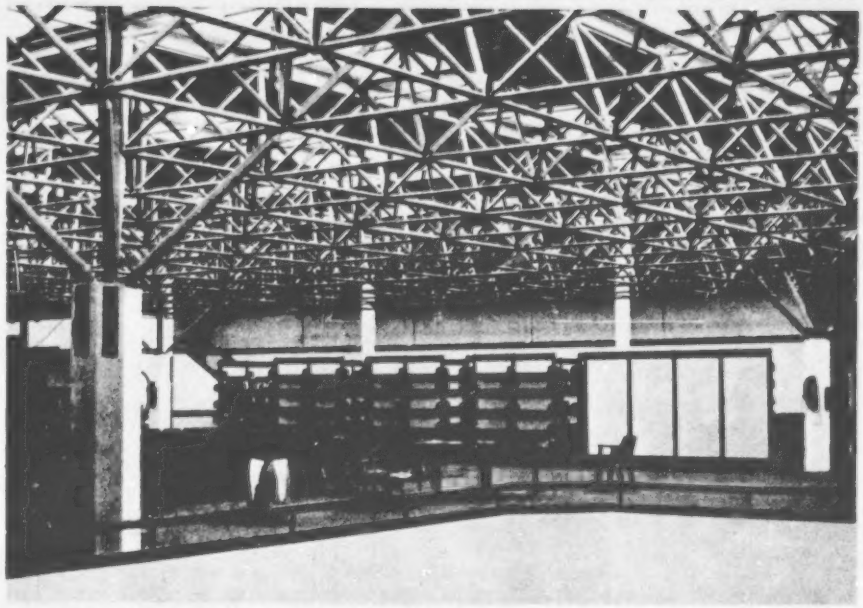


In 1972-73, it was not yet used as a resource centre; the wide space available served for large group information activities (photograph 37); it thus duplicated the large ground floor hall, which was clearly under-used. Use as a library (photograph 34) remained below its true potential and was still only tenuously linked to the teaching/learning organisation adopted.

The layout shown on the plan is that of the architectural project. Studies conducted by the teachers are likely to lead to different proposals.

A difference is to be noted between the activities planned by the mixed team (local representatives and representatives from the Ministry of Education of the *Land*) set up to prepare the experiment and those organised when it was actually launched; this is partly due to material difficulties (lack of certain specialists, non-availability of some of the accommodation), but also to a conscious but probably temporary choice: practically all efforts as regards contents and methods were directed towards developing the concept of differentiation in the context of the *Grossraum*, the use of which, as indicated earlier, raised a number of problems. Consequently, the optional activities, which are the necessary complement to differentiation, are not as important at Fröndenberg as one might have expected.





34. Library.

35. Mock-up. The key position of the Resource Centre.

36. Self-supporting metal lattice structure.

37. An Information Activity.

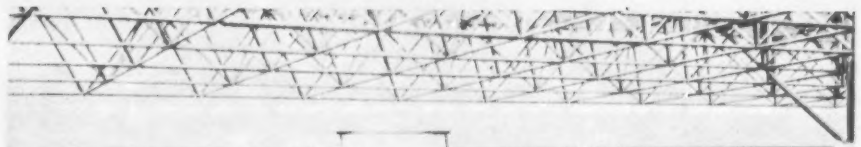


TABLE 14:
Utilisation of the Various Spaces for Teaching Activities

Designation of space		Rate of utilisation (1) %	Subjects (the figure in brackets = number of periods per subject)	User groups (4) Key: 1st figure = year 2nd figure = N° of large group concerned (the figure in brackets = number of periods per group)
in final plan	provisional allocation			
SCIENCE I (Physics and Chemistry)	idem	82	Physics (29) Compulsory options (2) Free options (2)	5.1 (3) 5.2 (3) 5.3 (3) 6.1 (3) 6.2 (3) 7.1 (3) 7.2 (3) 7.3 (3) 8.1 (2) 8.2 (2) 8.3 (2) 8 (4)
SCIENCE II (Biology)	idem	67	Biology (22) Physics (1) Compulsory options (2) Free options (2)	5.1 (2) 5.2 (2) 5.3 (2) 6.1 (2) 6.2 (2) 7.1 (2) 7.2 (2) 7.3 (2) 8.1 (2) 8.2 (2) 8.3 (3) 8 (4)
LECTURE HALL	idem	5	Compulsory option: Mathematics	8 (2)
MATHEMATICS III	Maths. 1	87	Mathematics (30) Compulsory options (4) Religious instruction (1)	5.1 (6) 5.2 (6) 5.3 (1) 5.1 (6) 7.2 (4) 8.1 (4) 8.3 (4) 7 (2) 8 (2)
LANGUAGES IV	Maths. 2	77	Mathematics (24) Option maths. (4) Religious instruction (3)	5.2 (2) 5.3 (6) 6.2 (7) 7.1 (4) 7.3 (4) 8.2 (4) 7 (2) 8 (2)
LANGUAGES I	French-English 1	82	English (24) French (8) Religious instruction (1)	5.3 (6) 6.1 (6) 7.1 (4) 7.2 (4) 8.1 (4) 8.2 (1) 7 (4) 8 (4)
LANGUAGES III	French-English 2	77	English (26) French (4) German (1) Religious instruction (1)	5.1 (6) 6.2 (6) 7.3 (4) 8.2 (4) 8.3 (4) 7 (3) 8 (5)
LANGUAGES II	without	42	German (4) Religious instruction (2) Maths. (2) English (6) Economics (1) Options (2)	5.2 (5) 5.3 (2) 7.3 (1) 7 (6) 8 (3)
MATHEMATICS I	Mother tongue	85	German (28) English (2) Religious instruction (4)	5.2 (5) 6.1 (7) 7.2 (4) 8.1 (4) 8.2 (4) 8.3 (6) 8 (4)
MATHEMATICS II	Mother tongue	80	German (28) Economics (1) Religious instruction (3)	5.1 (5) 5.3 (5) 6.1 (1) 6.2 (6) 7.1 (4) 7.3 (5) 8.1 (1) 8.2 (1) 8 (4)
LEISURE AREA I	Social science and Economics 1	65	Religious instruction (6) Social sciences (17) Art (2)	5.1 (5) 6.1 (3) 6.2 (5) 7.2 (4) 7.3 (2) 8.1 (4) 7 (2)
LEISURE AREA II	Social sciences and Economics 2	67	Social sciences (18) Religious instruction (3) Economics (4) Options (2)	5.1 (1) 5.2 (4) 5.3 (4) 7.1 (1) 7.2 (2) 7.3 (4) 8.2 (4) 8.3 (3) 8 (2) 7 (2)
SPORTS	idem	72	Sports (27) Options (2)	5.1 (3) 5.2 (3) 5.3 (3) 6.1 (3) 6.3 (3) 7.1 (2) 7.2 (2) 7.3 (2) 8.1 (2) 8.2 (2) 8.3 (2) 8 (2)
TECHNOLOGY (Workshops)	*Arbeitslehre* (3) Technology	50	Technology (12) Technical option (2) *Arbeitslehre* (4) Free options (2)	5.1 (4) 5.2 (2) 5.3 (2) 6.1 (4) 6.2 (4) 8 (4)
ARTS	Arts	75	Art (26) Free options (2) Option maths. (2)	5.1 (4) 5.2 (2) 5.3 (2) 6.1 (4) 6.2 (4) 7.1 (2) 7.2 (2) 8.1 (2) 8.2 (2) 8.3 (2) 7 (2) 8 (2)
MUSIC	Music	10	Free options (4)	8 (4)

(1) As a percentage of total time available: 40 weekly 45-minute periods.

(2) In 1972-73, the large group sessions in Science which should, in principle, take place in this hall, were held in the large laboratory earmarked for the pupils of the 9th and 10th years.

(3) Practical study of contemporary society.

(4) For example: 5.1 = large group No 1 (105 pupils) in 5th year.
7.3 = large group No 3 in 7th year.

Source: Internal documents of the school.

Note: This covers only partial use of the accommodation. Since, at the time of the observation, the school had not been finished, nor had the full enrolment capacity been reached, the figures are meaningful less in their absolute value than as a source of inter-comparison.

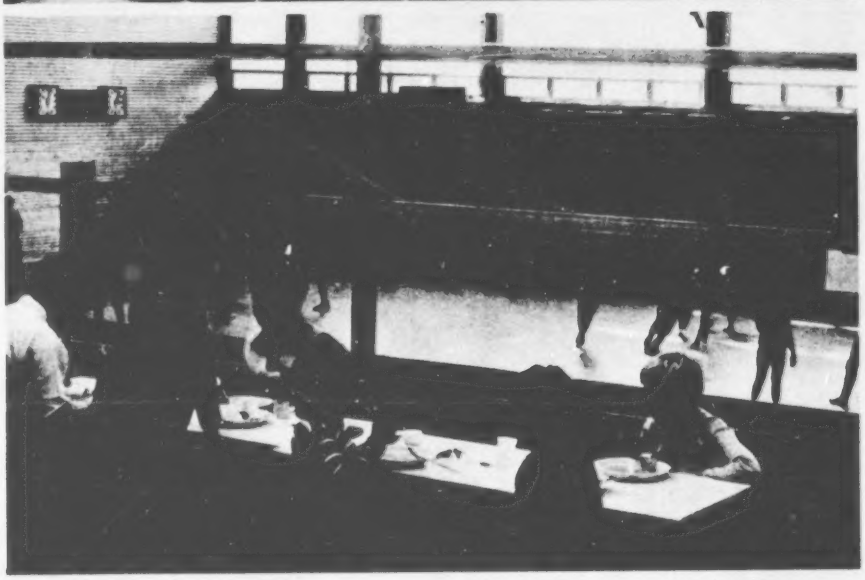
It is clear from this table that the way in which the spaces are used is only provisional. Nonetheless, a certain number of remarks can be made which are independent of this provisional use.

The departmentalisation (see paragraphs 70 to 76) is only of secondary importance and is almost academic. Due to circumstances, the actual allocation of spaces differ appreciably, from that envisaged at the design stage; this modification does not seem, however, to affect the implementation of activities. The reason for this is that the systematic character of the spatial layout and the resemblance of the various *Grossraume* make the distribution of the activities by space somewhat immaterial. Naturally, exceptions are science, arts and technology and, as noted earlier, languages.

The rate of utilisation of the science

areas, complete with fittings and equipment was already high in 1972-73, even though enrolments had only reached half the full capacity planned. It therefore seems justified to express some apprehension as regards the inadequacy of the science facilities in the long term and to consider the level of use observed as a relative overload. But one may wonder whether this overload is not the result of poor use of the laboratories, in which, as can be seen in photographs 32 and 38, activities are organised that could well be carried out elsewhere. It can therefore be expected that the pressure of needs will help rationalise the use of these areas and that they will be reserved for a more limited number of activities.

Social activities at Fröndenberg



38. A lesson being held in a laboratory.

39. The social areas essentially consist of marginal circulation areas which have been generously dimensioned. At the time of the observation, the leisure areas were used for teaching (see Table 14).

40. The poles of attraction for the social activities of the pupils are the cloakrooms and the dining room. The weekly meetings of the tutorial groups (consisting of about 15 pupils from all classes around a teacher of their choice) have no place reserved for this purpose. Some of them are held at the home of the tutor, hence outside the school.

III. GRÖNDALSSKOLAN, Värnamo (Sweden)

Värnamo is a small town in the county of Jönköping with about 28,000 inhabitants. *Gröndalsskolan*, planned for 544 pupils in the final years of compulsory education (7th, 8th and 9th years), has six parallel classes in each of the three years of study. Its source of enrolment is a network of schools providing the children of the municipality with the six previous years of schooling. It was opened in September 1971.

Preparation of the Project

The starting point for the project consisted of a programme drawn up by the county authorities in compliance with the norms in force in Sweden, and studies first started in 1968. The programme lists the number and types of spaces needed, thus defining a maximum total useful area of about 4,000 m2 which then served as a basis for calculating the total permissible expenditure (a state subsidy of 38 per cent was granted to the municipality). After obtaining clearance for the reinterpretation of the programme, a working group consisting of administrators, educationists and the architect was formed at local level. The county educational authorities lent much impetus to this group. The group acted however more as an advisory or reference group than as a design team. The work of the architect was largely predominant and the design proper, following a long period of reflexion and preparatory consultations, was carried out within a very short period.

TABLE 15:
Comparison between the Areas of the Standard Programme and the Actual Programme

Area	Basic programme		Programme implemented	
	Number	Total area m²	Number	Total area m²
General education (languages, mathematics, social studies and reading)				
Classrooms	16	960	6	362
Group rooms	7	168	10	92
Storage (for teaching aids)	1	48	—	—
Reading area	—	—	1	200
Main study hall	—	—	1	808
Special education rooms	2	49	—	—*
		1,225		1,462
Scientific education (chemistry, physics and biology)				
Classrooms/laboratories	5	300	4	338
Stores/preparation rooms	3	144	3	143
		444		481
Practical education (arts, crafts, home economics and commercial education)				
Workshops (specialised rooms with heavy equipment)	5	432	6	378
Workrooms	7	424	6	326
Open areas	—	—	1	390
Storage	5	69	2	28
		925		1,122
Library (documentation, information, reading and discothèque)				
Library	1	75	1	220
Reading room	1	40	2	55
Office	1	15	—	—
Information hall	—	—	1	112
		130		387
Areas for social life				
Dining room and cafeteria (including stage)	1	225	1	286
Staff dining room	1	35	1	40
Kitchen and annexes	1	45		115
"Cosy corners"	—	—	2	50**
Pupils' association room	1	20	1	37
		325		528
Teaching staff				
Common room (including kitchenette)	1	85	1	81
Working rooms	7	49	4	32
Preparation of teaching material	1	35	1	30
		169		143
Administration				
Offices, waiting room, files and records, caretaker's office, health service	8	94	11	123
	overall	64	overall	60
		158		183
Central cloakroom				
Cloakrooms	—	90	—	150
Lockers	—	90	—	55
		180		205

Area	Basic programme (total area in m²)	Programme implemented (total area in m²)
General education	1,225	1,462
Scientific education	444	481
Practical	925	1,122
Library	130	387
Social areas	325	528
Teaching staff	169	143
Administration	158	183
Central cloakroom	180	205
	3,556	4,511
(Gymnasium)	521	
	4,077	

* Nonetheless, an area of 29 m² earmarked for practical education is being used for this purpose.

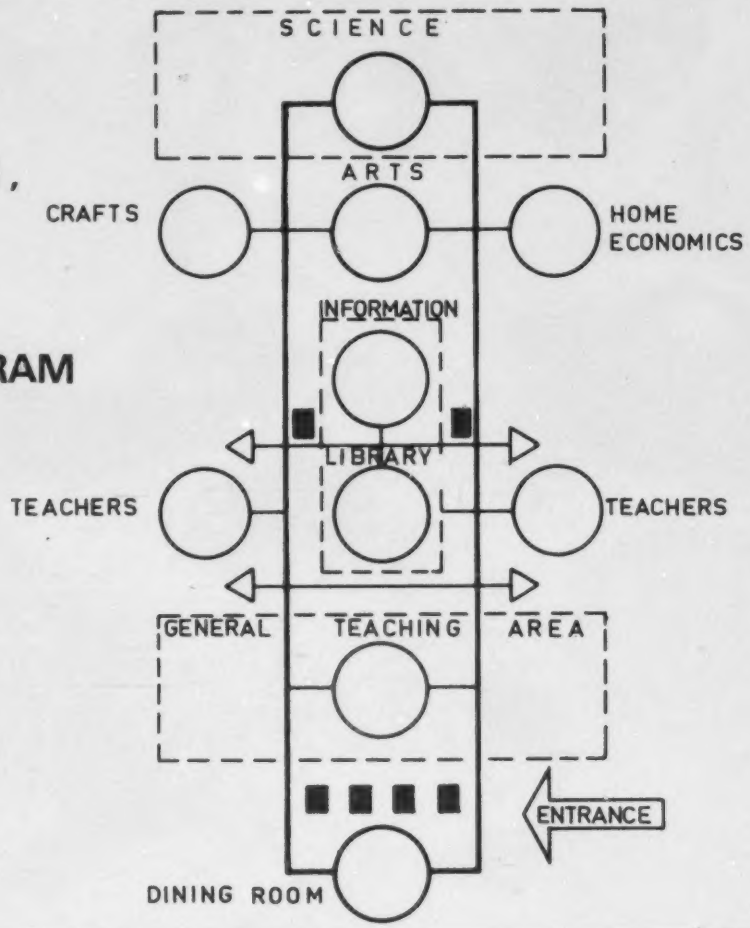
** Excluding the "cosy corners" incorporated into the dining room/cafeteria.

Remarks:

FIGURE 8

GRÖNDALSSKOLAN, VÄRNAMO :

FUNCTIONAL DIAGRAM



In contrast, negotiations between the municipality and the central authorities were lengthy. Finally, the local authorities took the responsibility, including the financial responsibility, of going beyond the programme and the maximum floor area defined in it in accordance with the official norms.

Table 15 makes it possible to compare the areas of the basic programme established according to the official norms against the programme that was actually implemented.

Characteristics of the facilities

The preparation of the project coincided with the implementation of the new curriculum for the Swedish Basic school *(Lgr 69)*.

The design objectives for the school were as follows:

— to provide a wide variety of spaces;
— to offer working possibilities to groups of differing size;
— to encourage interflow between individual subjects where grouped together into broader study fields.

This design approach was explicitly influenced by the SAMSKAP schools (Malmö). However, the layout of the plan differs quite appreciably. Instead of having a concentric structure, it is laid out lengthwise: the central part of the building, which is formed by the library and information hall, has two wide areas on either side; one is earmarked for teaching and studying activities which do not require much equipment, while the other is devoted to « creative » activities calling for specific and more substantial equipment. This can be seen in the following diagram:

The decision to open the facilities of the school to the community at large led to regrouping in the central part — which can be isolated from the remainder of the school — those areas which can be used in turn by the school and by the public: the library, information hall, social areas, drama room, music room and typing room. One of the problems with the library is whether its facilities can lend themselves to both leisure and study activities.

Remarks:

1. The programme implemented also includes certain areas not mentioned in the above table owing to the difficultyof comparing them against the basic programme which only indicates "useful areas". The areas in question are:

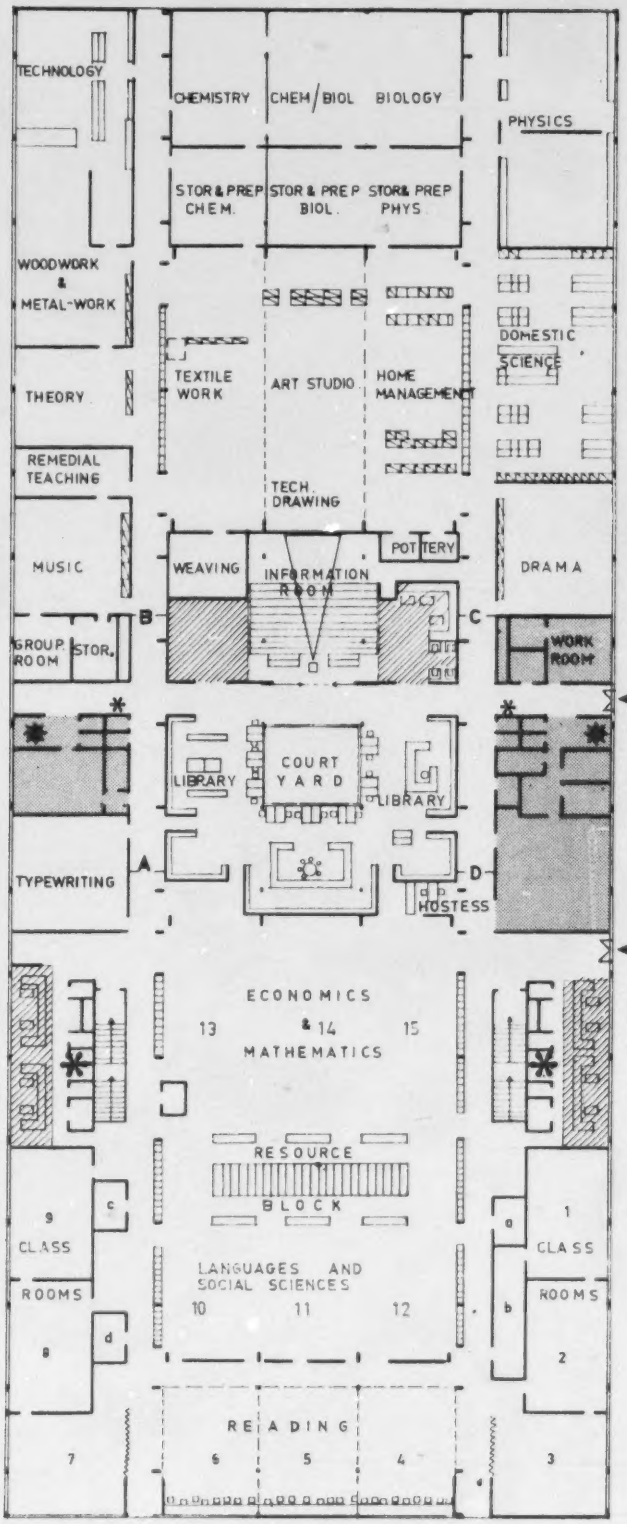
CIRCULATION	1,410
AIR-RAID SHELTERS	322
MAINTENANCE STORES	70
TECHNICAL ROOMS	356
LAVATORIES	136
	2,294 m²

The total area of the school is therefore 6,805 m².
In addition, a covered sports hall has been built adjacent to the school. It has an area of 1,610 m² and embodies the 521 m² of the basic programme.

2. The main differences between the two programmes stem from the fact that the municipality decided to finance over and above the programme for the school, certain facilities which form part of the project as a whole but are open to the general public (library and information hall, and sport facilities).

3. The principal feature of the design resides in the inclusion of open study areas which do not form part of the basic programme: these replace some of the ordinary classrooms and contain numerous storage facilities for teaching aids, which explains the considerable reduction in areas for storerooms as such.

GRÖNDALSSKOLAN :



Main floor

0 10 15m.
0 10 20 50feet

A.B.C.D : Community centre area

- LAVATORIES
- CLOAKROOM
- SOCIAL AREAS
- STAFF
- PARTITIONS REQUESTED BY TEACHERS
- TEACHING MATERIAL STORAGE

COMPREHENSIVE SCHOOL OF VÄRNAMO (Sweden)

Senior level of 9-year compulsory school .

TABLE 16:

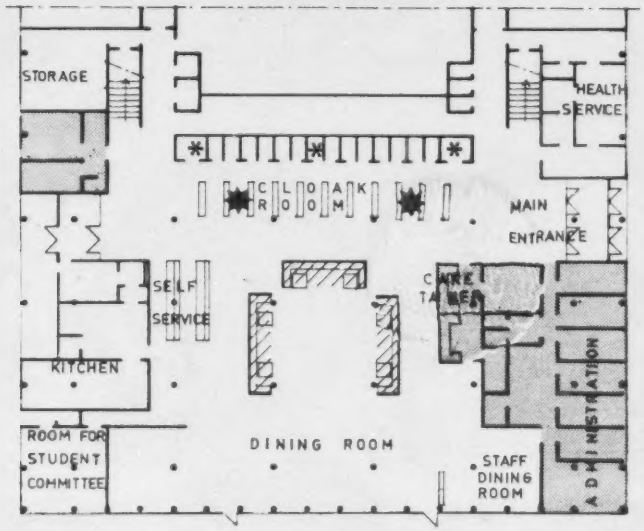
Rate of Utilisation of the Different Areas (Corrected for School Running at Full Capacity)

The percentage rate is the ratio between the actual work periods (corrected) in each area and the full time available — the numbers refer to the plan

Number/Designation	% of utilisation	0 to 20%	21 to 50%	51 to 80%	80 to 100%	Remarks
1	100				+	Demand exceeds availability
2	78			+		
3	20	+				
4 + 5 + 6 (average)	8	+				Open area
7	10	+				
8	100	+			+	Demand exceeds availability
9	100				+	Demand exceeds availability
10, 11, 12 (average)	34		+			Open area
13, 14, 15 (average)	22	+				Open area
Technology	66			+		
Woodwork & metalwork (including theory)	95				+	
Music	42		+			
Typewriting	18	+				
Chemistry	66			+		
Chemistry/biology	66			+		
Physics	66			+		
Domestic science and home management	48		+			
Textile work	30		+			Open area
Arts	54			+		
Drama	30		+			

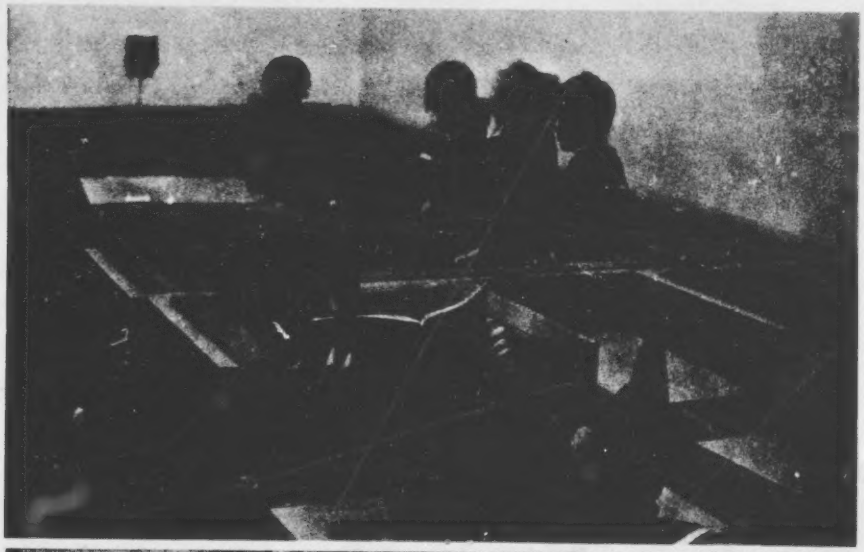
Source School timetable

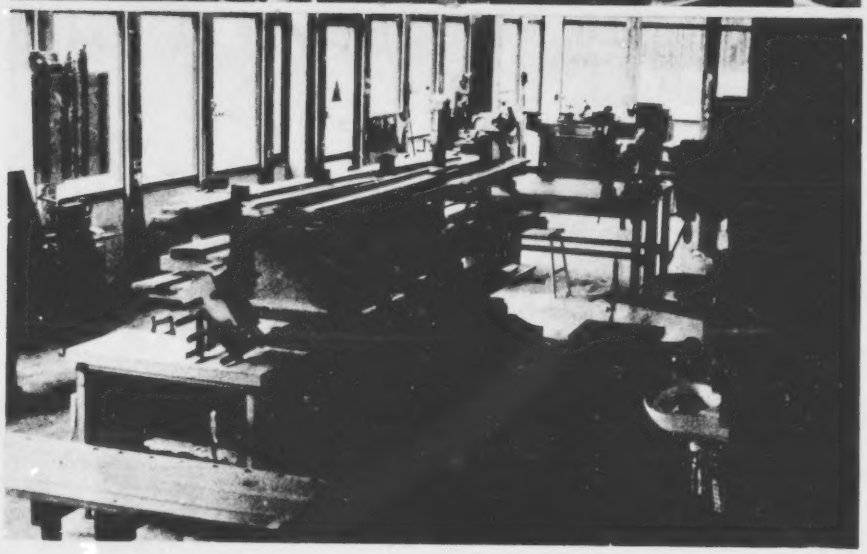
Note There are as many areas used above 50% as there are below. All the open areas except one are used less than 50%.



Lower level

Some examples of the variety of possible activities





41. A "cosy corner" in the library discotheque.

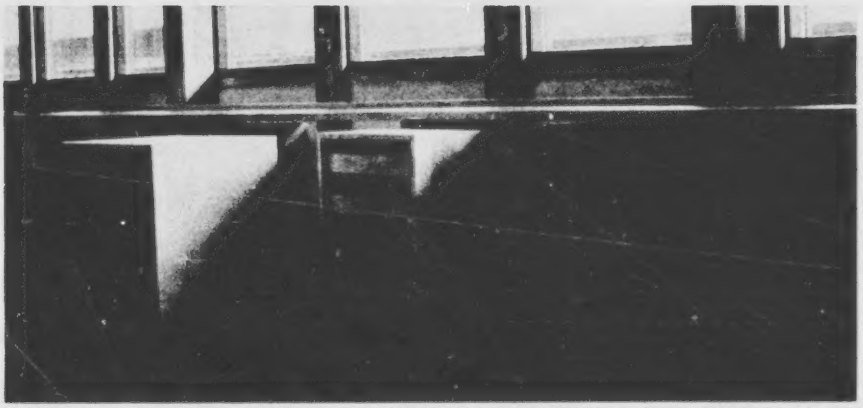
42. Pottery: a creative activity in one corner of the open area; the small closed rooms contain the oven, tooling and clay.

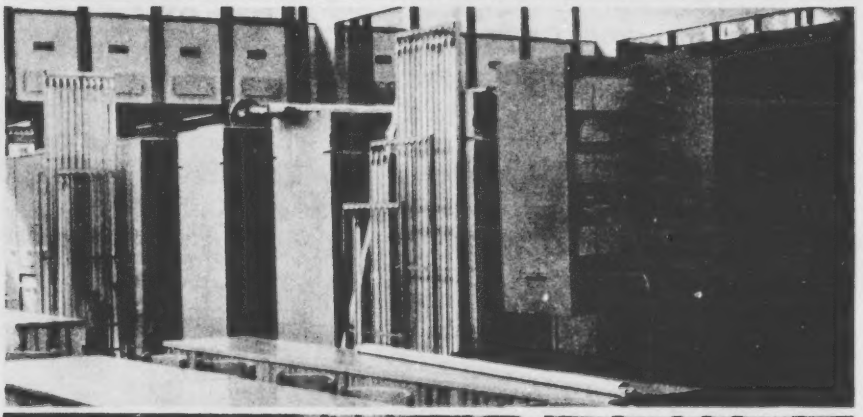
43. The woodwork and metalwork department.

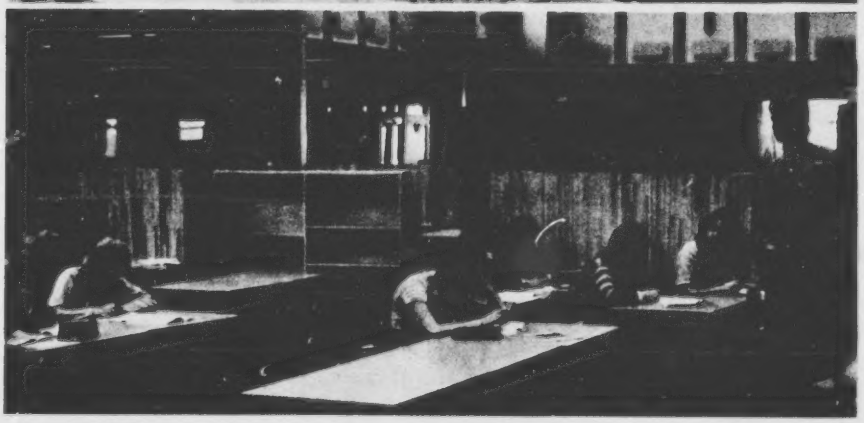
44. The home economics department.

Gap between design and actual use

The most important problem brought to light by this school is that of the use of innovative facilities by a team of teachers who were not specifically prepared to use such facilities (none of the teachers who participated in the working group during the briefing and design stages was appointed to the new school). For instance, the study hall is under-utilised, while the enclosed spaces are often over-utilised (see Table 16). The screens and carrels are often used to re-partition the area in the study hall and to reconstitute conventional classrooms: the resource centre for individual instruction in the middle of this hall is merely used for storing material. The high degree of flexibility sought in the design is not to be found in actual use. This gap between what was designed and what actually occurs points to the difficulties one encounters when changes in the physical environment are not co-ordinated with changes in the other factors conditioning educational activity.







One major characteristic: the high quality of the furniture

45. Furniture conceived as part of the building. The movable closed units are much more widely used than the open units.

46. The furniture of the pupils' dining hall. In the background, a "cosy corner".

47. Storage cabinets in the part of the open area earmarked for arts. This solution was preferred to that of providing stores, the area of which was cut down in the programme implemented (see total paragraph 95).

48. Gröndalsskolan Värnamo. Example of an open area not used as originally conceived: the conventional class is reconstituted in the study hall.

IV. SAMSKAP

A swedish example of co-operation in school building at local level in the MALMÖ region

SAMSKAP is an organisation for co-operation between local authorities, architects and educationists in the south west of Skana, the province which forms the southern part of Sweden. The organisation comprises five local municipalities including that of the city of Malmö. Behind its creation lie:

— **educational factors** - the Malmö region has been the scene of forward-looking educational experiments for over 10 years; among other things, the problems of the relationship between educational innovation and school building have been the subject of particular attention;

— **economic factors** - in addition to the need to control the cost of new buildings important measures were taken by the central administration (Ministry of Finance) to encourage the co-ordinated planning of school building at local level.

SAMSKAP was set up in 1967 and has operated simultaneously as a body for conceiving projects and as a mechanism for co-ordinating decisions. The conceptual work, which is directed by a working party, has been developed through a great many meetings in which representatives of all the groups concerned participate: local administrators and politicians, educationists, teachers, pupils, youth leaders, heads of schools (and even caretakers) and finally architects, technicians and contractors. This work proceeds from the study of the interrelationships between the objectives of the basic school, its curriculum, its working methods, its physical environment and the teaching aids it uses. Although SAMSKAP started to work before the publication of the official texts, its conceptual studies use as a point of departure the guidelines set down in 1969 by the Study Plan for the Basic School, *Läroplan* or *Lgr 69*, which in turn were based on the results of many experiments undertaken in Malmö and elsewhere following the structural reform of the educational system that took place in 1962.

From the educational standpoint one of the most interesting results of SAMSKAP is that it has led to the elaboration of a theoretical model which coherently expresses the combination of means required by a multi-option type school. The guiding principles of this model, as well as its graphical presentations are summarised in paragraph 29. This model embodies many observations made in respect of activities and teaching/learning methods such as those described in paragraph 86.

From the organisational standpoint SAMSKAP is an example of fruitful co-operation between the various parties concerned with school building, who not only share common purposes but are also capable of an open dialogue throughout the briefing and design stages of projects (see paragraphs 131 and 132). Among the problems which have arisen the following should be mentioned:

— benevolent services. Almost all the participants in the SAMSKAP groups have collaborated in this activity by sacrificing their own free time. It has become clear that, this being so, this benevolent participation could hardly be pursued beyond the end of the pioneer stage;

— the gap that occurs between innovators and persons representing the organisations and institutions concerned. There is no doubt as to the creativity of the former; however, if they alone participate in the work without being representative of the groups to which they belong, the projects developed are liable to be rejected;

— the scale on which work is to be undertaken (see paragraph 135). At present, agreements are being concluded with other local groups (example: Göteborg) in order to overcome a certain stagnation in the development of the experiment.

The salient features of the SAMSKAP schools

As Birgit Rodhe points out in an article that has appeared in *Prospects*, the schools built under the SAMSKAP programme have the following architectural features:

— The total area agrees with the norms enforced by the government and thus with those of traditional schools; deviation from tradition lies in the disposition of available surfaces;

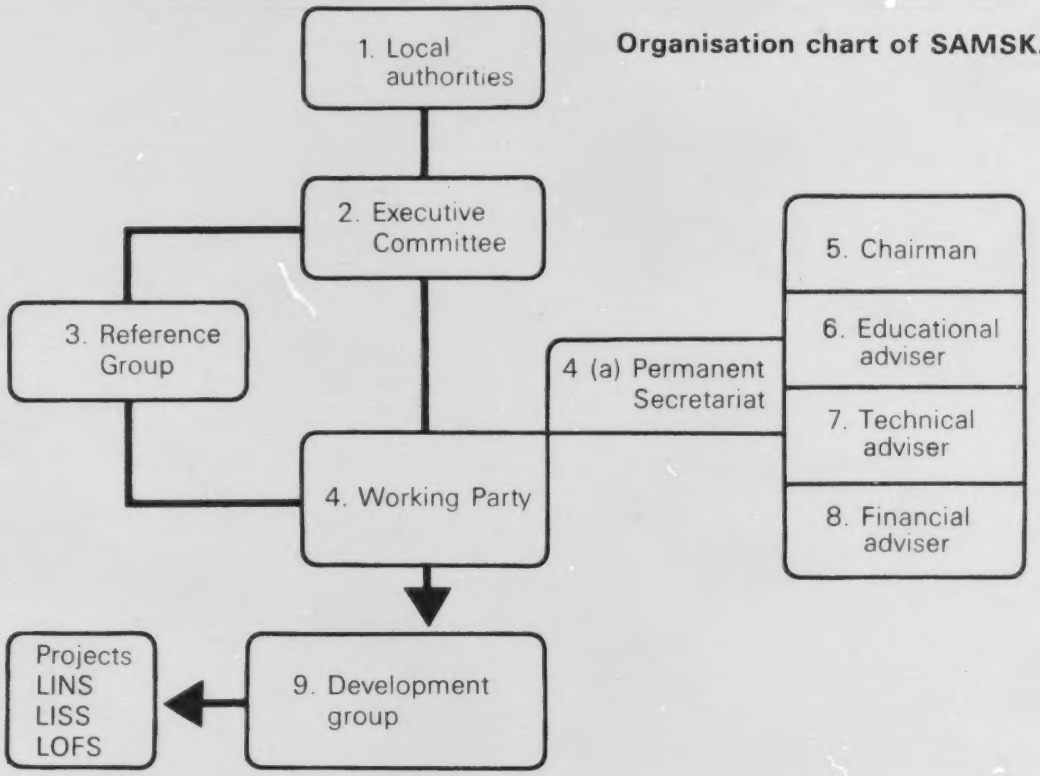
— each pupil belongs to a basic group; with some area at its disposal which need not be a classroom but can be used for several different purposes;

— the central area for study is a hall, a media library or resource centre

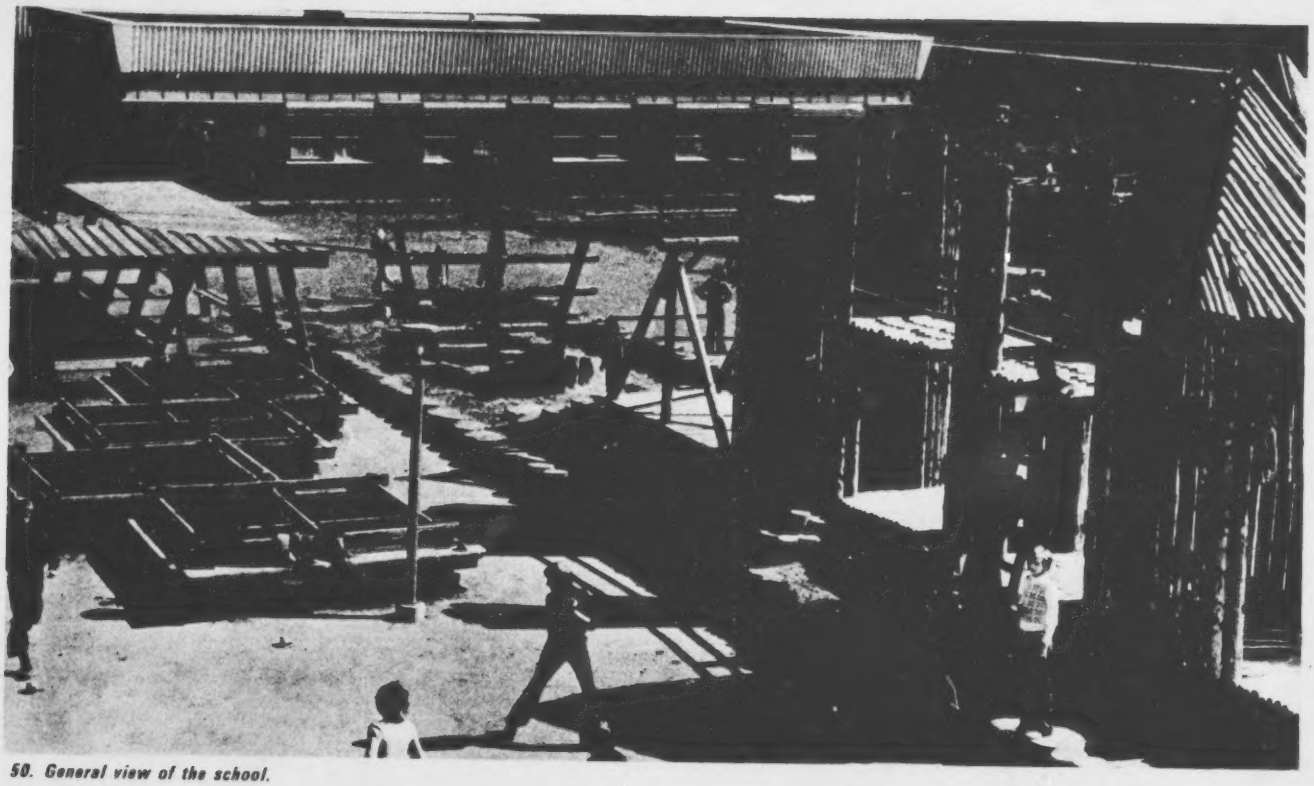
49. Multi-service column in a SAMSKAP school.

Municipality	Year	Number of schools built						Total
		1969	1970	1971	1972	1973	1974	
Malmö		2	—	3	2	2	2	11
Bara		—	—	1	—	—	—	
Burlöv		—	1	—	—	—	1	7
Staffanstorp		1	1	—	—	—	—	
Trelleborg		—	1	1	—	—	—	
TOTAL		3	3	5	2	2	3	18

Organisation chart of SAMSKAP



	Composition	Responsibility
1.	The municipalities of Bara, Burlöv, Malmö, Staffanstorp, Trelleborg.	Sponsorship of projects.
2.	Members of the municipal councils for education. Directors of Education.	Policy and planning. Directives to the Working Party. Appointment of members of the Working Party. Supervision and reporting of activities.
3.	Delegates of teachers, other personnel and pupils' organisations.	Advice.
4.	Educationists, guidance officers, educational advisers, parents and pupils.	Implementation of the directives of the Executive Committee. Laying down of guide lines for the architects and co-operation with them and with the other SAMSKAP technicians. Negotiations with the relevant services of the municipalities on matters of construction. Dissemination of information on SAMSKAP. Answerable to the Executive Committee for follow-up.
5.	Deputy director for Education of the municipality of Malmö.	Responsible, as part of the functions attached to the post, for school building problems; acts as chairman of the Working Party.
6.	Half-time educationist.	Initiation, co-ordination and follow-up of educational development work within SAMSKAP. Dissemination of information on SAMSKAP.
7. & 8.		Technical and financial aspects of activities. Checking of projects. Long-term economic forecasts.
9.	Malmo Teacher Training College. School of Architecture, Lund.	Scientific sponsorship of the spin-off projects: LISS: application of the **Läroplan** in the SAMSKAP schools; LINS: teaching aids in new schools; LOFS: facilities for social and leisure activities in schools.



50. General view of the school.

where teaching aids of various kinds are available both to pupils and teachers and where the equipment is planned to allow for active student work: carrels for individual study, tables for work in small groups, movable screening-off devices to bring about a quiet *milieu* for group discussion of about eight or ten pupils, etc.;
— around the study resource centre, closed work space is available for functions of work which demand special attention as to acoustics, access to water, gas, electricity; for instruments or large tools (laboratories, workshops, gymnastic halls, rooms for language arts, etc.);
— information for large groups is concentrated on an area, equipped with qualified audio-visual aids. This area has been procured by the saving of circulation space. It may be combined with the dining area and usually contains a scene for dramatic performances;
— wall-to-wall carpets in most rooms contribute to muffling the sound level and to creating a cheerful atmosphere;
— the school's out-door environment is planned for pupil activities and public use both in and out of school hours;
— wherever possible, the joint use of premises with youth centres and other community activities is attempted;
— this last feature is becoming, more and more, a dominating line in city planning in the Malmö region as elsewhere in Sweden. Recently the Malmö City Council took the final decision on the first project of comprehensive planning for a community centre in a new housing area in the southern part of Malmö. All co-operating institutions: school, public library, youth centre, day-care centre for pre-school children, sports centre, open into a common market place for various activities, recreation and many-sided social contacts. As many areas as possible will be used in varying ways during as many hours of the day and night as may be deemed desirable;
— one important characteristic of the emerging new school in Sweden is the desire to integrate, as far as possible, children who are in some way educationally handicapped, into normal schools. An advanced example of the realisation of this principle is offered by one of the SAMSKAP schools, the Örtagårdsskolan in Malmö. It is the first school in Sweden where educationally sub-normal children are actually taught in the same school building as other children with open communications between instructional areas for all categories of children (1).

An example of a SAMSKAP school: KROKSBÄCKSKOLAN, Malmö

This school, which was built in 1971-72, comprises the three levels of the basic school (years 1-3, 4-6 and 7-9). The table, plan and photographs below concern the final three years (7th, 8th and 9th) forming the terminal level of compulsory schooling. At the start of the 1973 school year, the enrolments for these three years were the following:

— 7th: 166,
— 8th: 148,
— 9th: 0,

i.e. a total of 314, corresponding to an enrolment of 480 for the terminal level as a whole.

Every year an estimate is made of the expected distribution of pupils amongst the options offered. This enables the activities of the school and in particular the use and layout of the facilities to be organised in advance.

The following table shows the difficulties of such detailed forecasting, despite a stable distribution for the Malmö schools as a whole.

1) **Prospects**, Quarterly Review of Education, UNESCO, Paris, Vol. II, N° 1, Spring 1972, page 95.

TABLE 17:
Optional Subjects: estimated and actual choices (year 1973-74) (1)

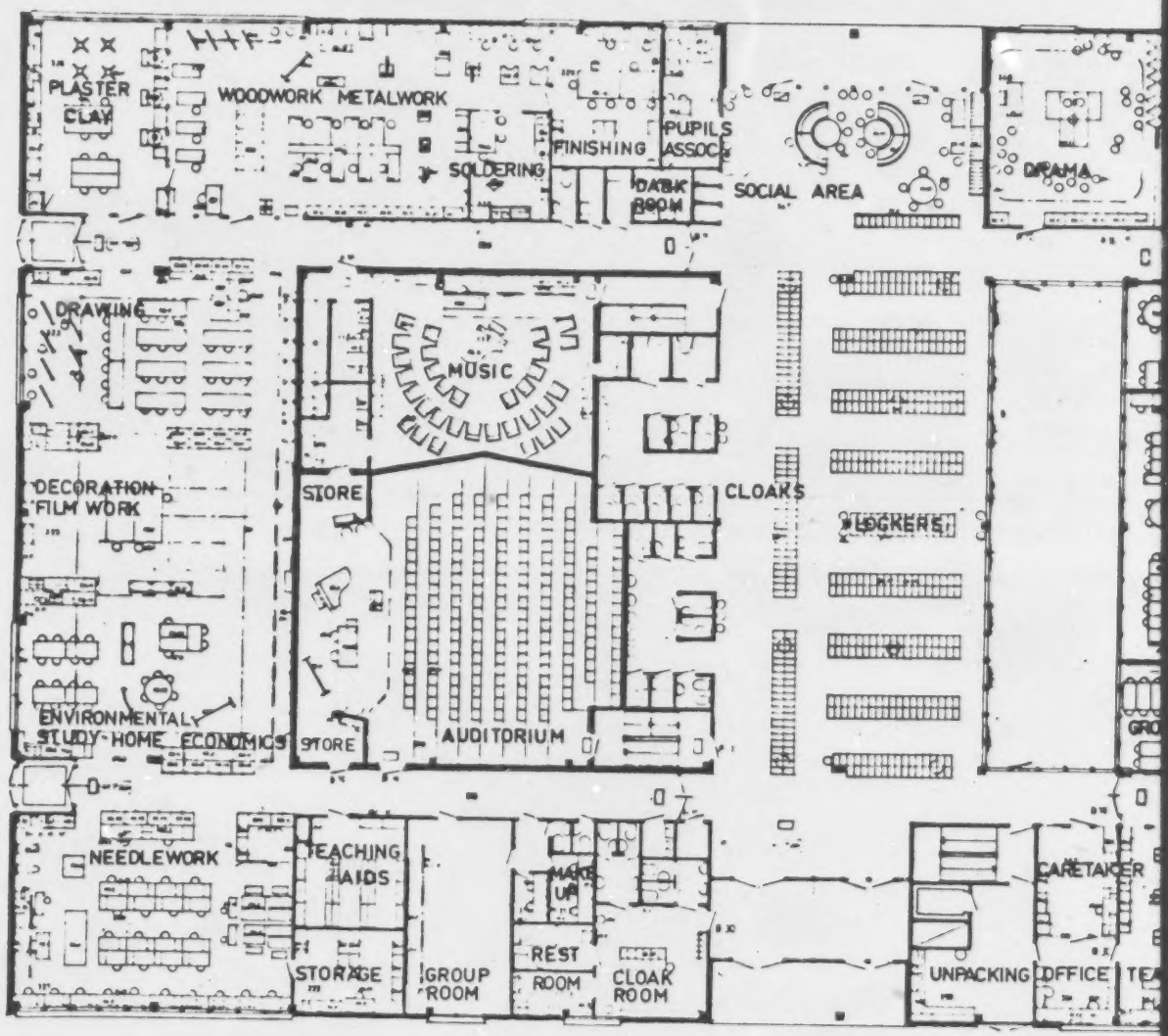
	Compulsory subjects							Optional subjects				
	Mathematics		English		Economics	Arts	Technology	French		German		Total number of pupils
	G	S	G	S				G	S	G	S	
7th year (estimated)	31	26	23	34	8	1	14	3	5	11	15	57
7th year (actual)	53	113	43	123	16	11	29	7	30	17	56	166
8th year (estimated)	54	115	51	118	24	11	22	13	22	25	52	169
8th year (actual)	32	116	25	123	8	0	16	7	33	16	68	148
Total for Malmö schools 7th year in % 1973	31.2	68.8	21.1	78.9	11.6	3.8	20.6	2.2	17.6	10.3	33.9	100
1972	30.5	69.5	24.9	75.1	11.1	4.6	20.0	2.8	17.9	9.9	33.7	100
Total for Malmö schools 8th year in % 1973	31.6	68.4	26.9	73.1	14.0	3.1	18.6	2.4	15.8	11.7	34.2	100
1972	30.9	69.1	26.3	73.7	13.5	3.3	17.5	2.2	16.3	11.4	35.2	100
Total for Malmö schools 9th year in % 1973	39.1	60.9	29.1	70.9	12.4	6.3	19.0	5.7	15.0	14.5	27.0	100
1972	37.8	62.2	28.8	71.2	12.2	6.3	18.9	4.9	16.3	13.6	28.0	100

G = general course
S = advanced course
G + S = 100% in each compulsory subject.

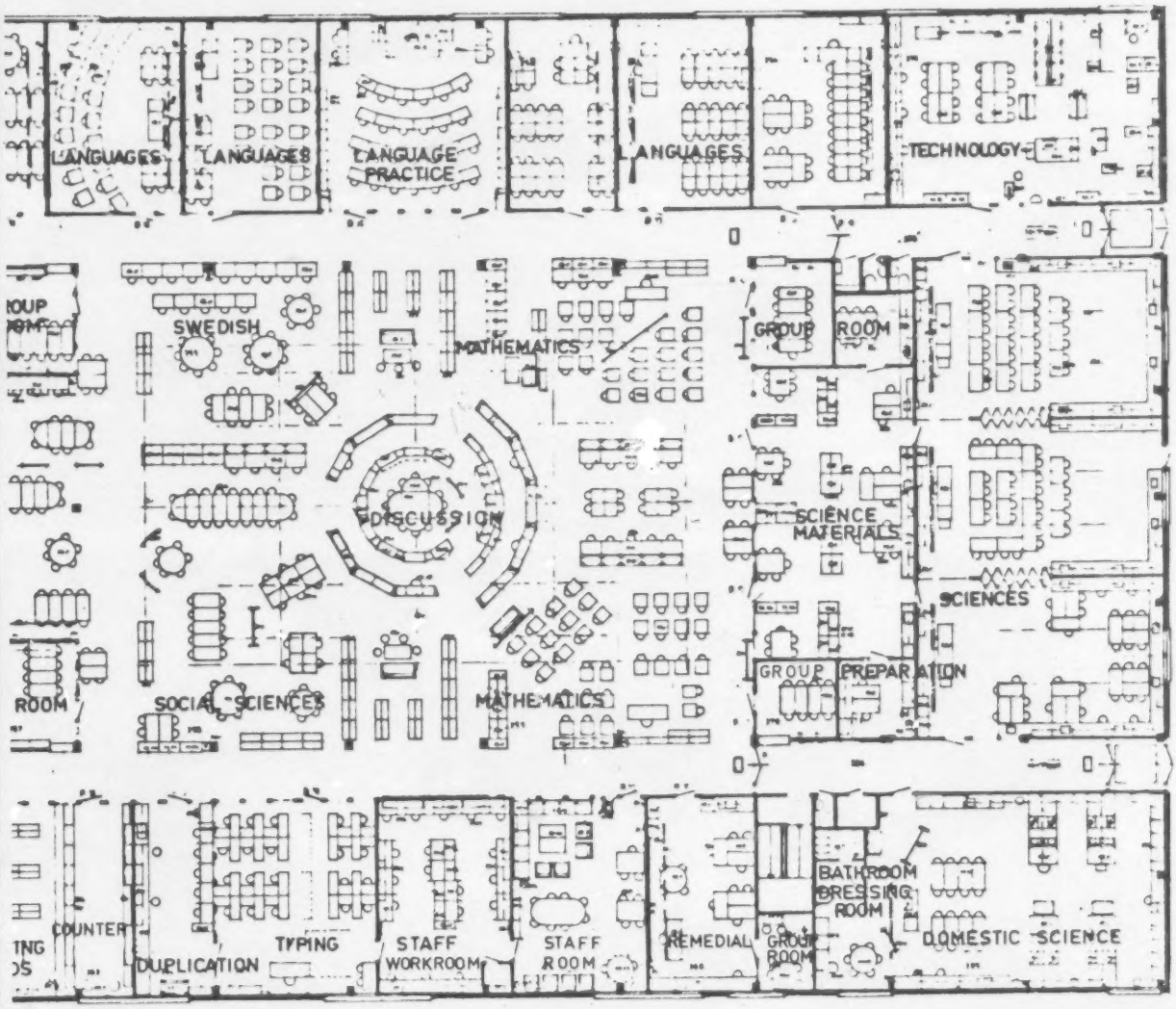
(1) See Table 1 for weekly allocation of periods.

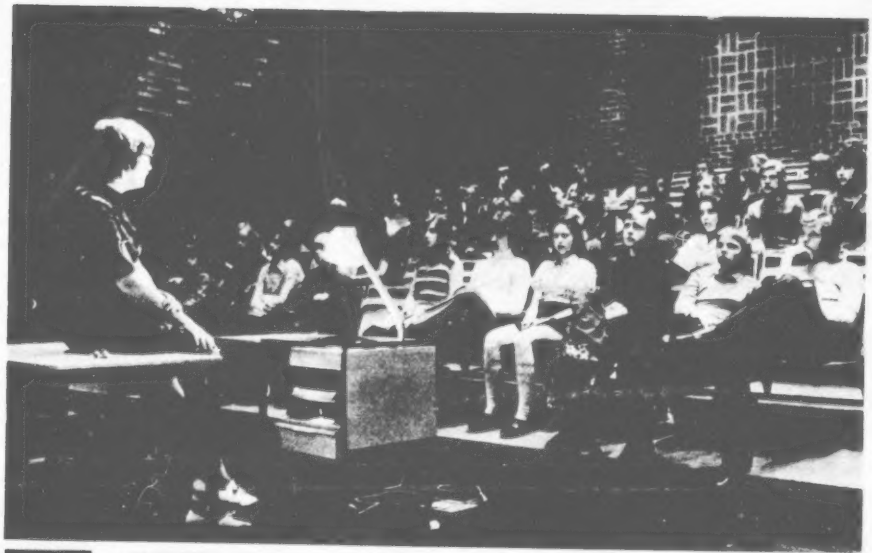
53 Work in the open area with a resource centre in the middle (independent study).

KROKSBÄCKSKOLAN (Sweden)



UPPER SCHOOL (13 TO 16)





51. Group information.

52. Work in a small group in one of the rooms (15 m²) adjacent to the open area.

Initial Evaluation of the SAMSKAP Schools

One of the most innovative features of SAMSKAP resides in the research projects or studies which have been undertaken on the basis of the schools built or concerning them. This work, which is of a scientific nature, was entrusted to teams of research workers from universities. The following is a summary of the main conclusions of the report of the team directed by Bertil Gran (Department of Research, Malmö Teacher Training College) on the open plan schools in the Malmö region (1). The main purpose of the study was to prepare the instruments for an evaluation in depth and to provide the staff with information to help them pursue their task. It was therefore not intended to be a systematic evaluation of the way the schools operated and caution should be exercised in interpreting the data set forth in it.

One of the most important results is that major differences exist between one school and the next. Their layouts differ considerably, probably more so than do conventional schools between one another. Accordingly, the SAMSKAP schools cannot be considered as a single group or type. The way in which the study hall is used in the various schools provides a good example of this diversity. In one school it was used at one and the same time for group activities and individual activities, for pupils in different years and at different levels; in another, it was used as two large classrooms separated by storage units, providing permanent accommodation for two classes; in a third, it was divided by screens into a large number of « boxes » for small groups or for individual pupils; in a fourth, it merely amounted to an annex to the adjacent rooms; in a fifth, it was mainly used for free activities during breaks between classes and for individual work.

An analysis of the correlation with the eight basic principles set forth as starting points for the building of open plan schools (paragraph 29) provide the structure for the detailed conclusions.

1. The principle of adaptability

This principle has not been defined precisely enough to be used as a basis for analysis. Adaptability can be considered from two points of view: one applies more to the future, and relates to changes that may occur with time in the internal layout and internal arrangement of the schools, while the other applies more to the present, and concerns the degree of flexibility offered by the facilities and their furnishings to meet current educational requirements. The layout of the furniture and separating screens has been continuously modified in several of the schools, so in this sense the principle of adaptability from the second point of view has indeed been complied with.

In all the schools, the areas provided for the enrolment capacity planned are well above the minimum prescribed and it should therefore, in theory, be easy to select the most suitable space for each activity. However, it should be noted that when, at the terminal level of compulsory schooling, the schools have to accommodate more pupils than planned, this overcrowding considerably impairs flexibility in the use of the facilities and in the teaching methods applied. The initial concept, the aim of which was to permit specific activities in certain areas can then no longer be applied, giving rise to various disturbances.

2. The principle of integration between the school and various social activities

The schools have gradually had to accept dual use of their facilities, i.e. both for the purposes of the school and for the leisure activities of the community. This is particularly the case with dining halls, cafeterias, information rooms, study halls, resource centres, workshops and open-air facilities; in some schools a youth club is included in the building. This type of integration can give rise to problems, especially for staff, for instance where there are two different sponsor administrations and hence differences in the definition of working duties. The disturbances to leisure activities caused by school activities and *vice versa*, must be given careful attention.

3. The principle of variation in the activities of the pupils

The possibilities of using the various areas for a range of activities varies from one school to the next. In addition, the analyses show that the nature of the activities varies considerably depending on the area in which the particular activity takes place. Further studies

1) Gran, op. cit., pages 207 to 216.

will have to be made, however, to find out to what extent the design of the facilities determines the activities and just how far the organisation of the activities can determine the use made of the facilities; if the margin of flexibility is too narrow, there is a danger of certain activities becoming predominant. The fear that the various groups may hinder one another in an open area can lead to excessive proliferation of independent work in the form of reading and written exercises, at the cost of creative activities. In theory, sliding or mobile partitions could offer wider possibilities for keeping the various activities apart, and all teachers advocate this solution, whether they have tried it or not. However, in several schools, these partitions seem to remain either always closed or always open and hence have never been used to increase flexibility. The teachers all agree that noises liable to disturb work are a major problem in open areas, but they also consider the noise level high in ordinary classrooms, anyway. At the same time, they feel that the sight of other groups at work is a highly positive factor. The conclusion is that the various subjects and activities do not all have the same need for isolation or co-operation and that both enclosed and open areas are needed.

4. The principle of variation in the grouping of the pupils

One of the reasons why areas of different sizes have been provided is to permit variation in the group sizes. The possibilities thus offered have been used extensively in certain schools and only seldom in others. This should be related to the way in which the principle of team teaching has been applied. In general, both pupils and teachers consider that the most positive way to work is in small groups. However, it should not be forgotten that small groups of pupils are dependent on the existence of large groups on other occasions. One major question that has not been examined within the framework of the study is that of the need for the pupil to belong to a permanent group and his need to meet different groups of friends and also to have more contacts with adults. All schools adopted the class as the administrative unit. However, in one of them, this unit was practically discarded in favour of a more flexible system of grouping as part of team teaching.

In summary, it appears easier to vary the grouping of pupils in an open environment than it is in a school of conventional design. From the point of view of directing studies, the fact that several teachers can together use the open area so as to help a varying number of small groups in their work, appears to be an advantage: conversely, the pupils consider that group work can take place just as well in smaller spaces.

5. The principle of team work

Team work can comprise several degrees and forms of co-operation: from informal collaboration to planned and structured co-operation, it can involve teachers only, or may include pupils and other categories of staff; it may be confined to division of labour, or may imply direct collaboration between teachers during the teaching session itself. Team teaching tends to occur when the facilities enable several teachers to get together in the same place with several groups of pupils. The question arises as to whether the screens or other separations have not sometimes been set up without giving serious consideration to the importance it is wished to impart to team teaching. Lastly, the teachers appear to be quite torn between the psycho-sociological side to education and the tendency to aim primarily for academic results; this conflict is not however, specific to open plan schools but exists throughout the educational system.

6. The principle of co-ordination between different subjects

In several schools, inter-subject co-ordination took the form of study of major topics, not confined to any one age group, more compatible with the individual interests of the teachers and putting to best use the qualifications of each (history, geography and other social sciences, natural sciences, etc.). Here, the schools offer extensive possibilities, since the facilities have been designed and fitted out to satisfy this requirement. However, it appears that certain teams of teachers, particularly in science, have not availed themselves of these possibilities, since the sliding or mobile partitions have been used for permanently sub-dividing the rooms and partitioning off the equipment. The principle of co-ordination between different subjects is closely tied to that of team teaching.

7. The principle of provision of a wide choice of media

One of the design objectives of open plan schools was to locate the teaching aids as near as possible to the study areas. This is why stocks of books and other media have generally been situated in the centre of the schools in the study hall. As regards the terminal level, specialised material is also available near the various bases provided for subjects or groups of subjects (science, foreign language and social sciences). Comparative studies would be needed in order to find out whether this readier availability actually increases the use made of the material, or not, and just how far the free access to it encourages the pupils to work independently.

8. The principle of integration of remedial teaching (for disadvantaged children)

Most openplan schools have certain « clinical » facilities for remedial teaching. However, only in two out of eight schools do special classes exist. Several schools practice a form of co-ordinated remedial teaching which directly links « clinical » teaching to normal teaching through the direct co-operation of teachers in the ordinary classes. Educationists universally agree that remedial teachers can be more useful in an open environment than in a conventional type of school. It is commonplace for remedial teachers to collaborate with other teachers, especially in the study halls, where they then form part of the normal teaching team.

Ultimately, this study has served to show that there are sometimes uncertainties in schools as to the intentions underlying the design of some of the facilities and the best way of organising the work in them. The non-teaching staff, asked among other things for more information concerning both the work and the operation of the school. Surveys conducted amongst the teachers likewise brought to light a need for information and for additional training. These remarks show the great importance that should be attached to problems of personnel policy when open plan schools are brought into operation.

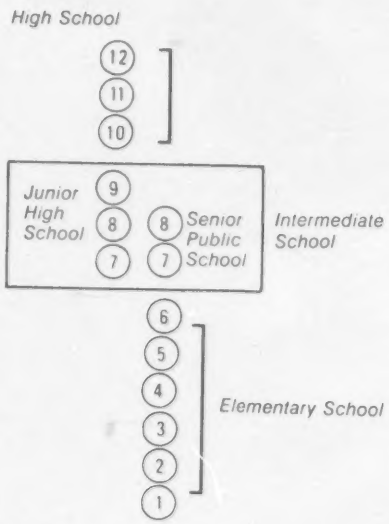
V. SEF

A canadian example of an integrated approach to school building

Definition of Requirements for the Intermediate School

SEF, the Study of Educational Facilities, is a research organisation created in 1966 by the Metropolitan Toronto School Board, Canada, and largely inspired by the work undertaken in California to develop an industrialised system for school building (SCSD - School Construction Systems Development). Its main objective was to determine, on the basis of detailed analyses of present and future educational needs, the kind of facilities required at elementary and secondary education levels, and to develop a building system which would satisfy these requirements with the maximum of flexibility and at the least cost. Right from the outset SEF received the encouragement and financial support of the Educational Facilities Laboratories (EFL) of New York City, and by 1969 had a permanent staff of twenty-five people of whom eight educationists (educational research workers) and six technicians and was headed jointly by a technical director and an educational director (1).

The problems inherent in developing industrialised systems for school building, which was one of SEF's principal activities, are examined in another study within the OECD Programme on Educational Building, the results of which are to be published in the Autumn of 1975. For this reason only design aspects are considered here, i.e. determination of needs and definition of corresponding facilities. SEF has published the results of its work in this field in three different reports which concern respectively the primary or elementary school, the lower secondary or intermediate school and the upper secondary or high school (2). In order to understand the following summary made below of the Chapter on facility and area requirements for intermediate schools, it seems essential to explain the place of these schools in the educational system of Metropolitan Toronto. Besides the traditional secondary schools, High Schools, covering the 7th to 12th years of study, there were the Public Schools which represented a continuation of primary education up to and including the 8th year of study. With a view to unification aiming at establishing one and the same school for all children, a new type of school, the intermediate school, was created on the basis of the first three years of secondary school (7th, 8th and 9th year) and/or the last two years of the complementary primary school (7th and 8th year). The intermediate school can thus be regarded as a lower secondary school, with primary education consequently reduced to six years. The unification thus achieved is however not complete since the structure of the schools differs with their origin. While a distinction is thus made between Junior High Schools (7th, 8th and 9th year) and Senior Public Schools (7th and 8th years), the same educational model is applied to both.



Definition of Facilities Required for Intermediate Schools (3)

The space and area recommendations for the intermediate school are based on a theoretical educational programme drawn up by SEF. The indications given below all apply to an 878-pupil Junior High School. This choice was determined by the fact that the corresponding area recommendations coincided with the intermediate school allowance of the 1968 Ceiling Cost Formula.

According to SEF's theoretical programme the required areas for intermediate schools are as follows:

Information Service Area
1. Library Resource Centre.
2. Audio-Visual Service Area.

Open Learning Areas
1. General Learning Areas.

Unified Arts Area
1. General Science Laboratory Area.
2. Industrial Arts Area.
3. Home and Consumer Education Area.
4. Visual Arts Area.
5. Unified Arts Common.

Enclosed Learning Areas
1. Music Area.
2. Typewriting Area.
3. Physical Education Area.

Administrative and Ancillary Areas
1. Administration Centre.
2. Counselling Centre.
3. Health Centre.
4. Cafetorium.
5. Staff Lounge and Dining Area.

Service Areas

Information Service Area

The school of the future will be much more oriented towards the learning needs of the individual pupil and the rapid processing and procurement of information. School work will no longer consist of the regimented movement of pupil groups or classes from one teacher to another, from one classroom to another. Learning will occur in pupil groupings of various sizes within differing time blocks, guided by teacher teams of varying sizes, and in open and enclosed areas of different sizes which can be easily and inexpensively altered to accommodate changes in the organisation of the work.

1) The work of SEF has recently been the object of an evaluation study undertaken by a team of people under the leadership of Alexander B. Leman, architect. This study is shortly to be published in (English and French) by the Department of Industry, Trade and Commerce, Ottawa, under the title: **A Study of Systems Building, Evaluation of SEF.**

2) SEF E1, **op. cit.**, pages 74 to 76.
SEF E2, **op. cit.**
SEF E3, **Educational Specifications and User Requirements for Secondary Schools**, Ryerson Press, Toronto, Canada, 1970.

3) Summary of chapter 5 in SEF E2, **op. cit.**, pages 43 to 49. Floor area indications in m^2 are rounded to the nearest whole number or, in the case of large numbers, to the nearest ten.

There will be few constants in future educational systems other than the need for competent teachers and for quick and convenient access to information.

1. The Library Resource Centre

In the intermediate school, the library resource centre constitutes a key facility and will therefore be described in detail immediately after the present summary.

SEF recommends the provision of a library resource centre capable of accommodating at any one time 20 per cent of the pupil enrolment, on the basis of 3.2 m2 (35 square feet) per pupil, i.e. a total of 567 m2 (6,162 square feet).

2. The Audio-Visual Service Area

Non-print materials (films, filmstrips, slides, videotapes, records, tapes, etc.) and the equipment necessary to project or use these materials will become important supplements to the traditional print materials. Pupils and teachers will increasingly become involved in the preparation and processing of these so-called « software » systems and materials, and increasing portions of school supply budgets will have to be set aside for the purchase and maintenance of these materials and their equipment. A specialised area will be required as well as an AV technician directed by a knowledgeable AV teacher-adviser.

Since these activities are integral parts of the school's information system, an enclosed location is recommended for this area, adjacent to the library resource centre. This area, including darkroom facilities, would require a minimum of 41 m2 (450 square feet).

Open Learning Areas

Certain subjects such as the mother tongue or history seem to be best accommodated in « general learning areas » most of which would be open space. Each of these areas would accommodate from two to ten teachers and from 60 to 300 pupils and would range in size from 180 to 1,100 m2 (from 2,000 to 12,000 square feet).

1. General Learning Areas

The subjects designated for accommodation in the general learning areas are: the mother tongue (in this case English), mathematics, history, geography, parts of a second language (in Metropolitan Toronto, usually French), health education and group guidance.

The essential parts of a general learning area are:

— teaching stations of approximately 69 m2 (750 square feet) each, capable of accommodating 30 to 35 pupils and one or two teachers, which might or might not be separated from other parts of the area by movable partitions or storage units;
— a common or central space of about 16 m2 (75 square feet) per teaching station; its overall size will thus vary with the number of teaching stations in the general learning area;
— seminar rooms of approximately 14 m2 (150 square feet) each, acoustically insulated and yet visually connected with the other spaces in the area, in the ratio of one seminar room for every three teaching stations, all with demountable partitions;
— a workroom for teachers and trainee teachers in the amount of approximately 5 m2 (55 square feet) per teacher (four trainee teachers = one qualified teacher);
— other facilities such as pupil washrooms and lockers serving pupil needs in one perhaps two, general learning areas.

Unified Arts Area

In the general opinion of the intermediate school committees of SEF certain parts of the curriculum are best taught in semi-enclosed areas in a separate part of the school, namely industrial arts, home and consumer education, visual arts and general science. The similarities in the activities to which they give rise, and in the design of the facilities needed to accommodate them, together with their acoustic, service and equipment requirements justify grouping them in this way.

Traditionally, each of these subjects was taught in separate and enclosed areas — in workshops for woodwork, metalwork, and needlework respectively, in domestic science rooms, art rooms and science laboratories. It is recognised that the areas needed for each of these subjects may have to be separated from the others by demountable or permanent partitions in order to meet educational specifications or fire regulations. SEF believes however that the four main areas which together make up the unified arts area should be adjacent, and that as far as possible each of the four should, within itself, be open and free of load-bearing walls or permanent partitions.

To encourage horizontal integration among these closely inter-related activities, SEF further recommends that a common space be provided. Easily accessible from each of the four main areas, it would not only provide space for the projects of individual pupils, but also serve as the teachers' workroom in this part of the school.

1. General Science Laboratory Area

Within the general science area, SEF recommends an open area encouraging multiple and concurrent activities. This open area would contain sub-areas oriented to physical and biological sciences. It is estimated that a total of 330 m2 (3,550 square feet) would be required, including storage.

2. Industrial Arts Area

Traditionally, the industrial arts curriculum centered around woodwork and metalwork in separate and enclosed workshops. This separation today appears unwarranted. SEF recommends an industrial arts curriculum which would familiarise pupils with the processing, fabrication and utilisation of different materials and with the use of manual and power-operated equipment of many types — in short, an expanded and more varied curriculum requiring an open area and specialised services. Within it, sections would be allocated to planning and research, to such crafts as ceramic and enamelling, to general electricity, electronics and power mechanics, as well as to woodwork and metalwork.

The basic size recommended for an industrial arts area accommodating 16 pupils and a teacher is 129 m2 (1,400 square feet) with an additional 28 m2 (300 square feet) for storage. An area accommodating 32 pupils and two teachers should be 258 m2 (2,800 square feet) plus 37 m2 (400 square feet) for storage, i.e. a total of 295 m2 (3,200 square feet) for the school used as reference.

3. Home and Consumer Education Area

In the past, the domestic sciences were mainly concerned with cooking and sewing, taught in separate areas. Today, the whole field of home economics is changing considerably. Increasing importance is being given to consumer in the library resource centre. In addi- education, resources management and social relationships. Specific topics might include household budgeting, care in purchasing, savings' plans, credit buying and interest rates, child care and dietary planning. It is envisaged that 32 pupils and two teachers would use the area simultaneously and for this an open area of about 230 m2 (2,500 square feet) would be required.

4. The Visual Arts Area

In order to encourage the development of visual arts activities it is essential to put an end to the provision of small, separate art rooms. The School Board's present norms for intermediate schools provide for one art room of 92 m2 (1,000 square feet) where 32 pupils and one teacher would work simultaneously for a 40-minute period. SEF completely disagrees with this norm since the curriculum in this field today includes not only the traditional drawing and painting but also ceramics, sculpturing, print-making, art appreciation, individual projects and audio-visual activities. Consequently, SEF proposes a reduction in the pupil/teacher ratio for visual arts to the level now current for home economics and industrial arts, i.e. 16:1.

Bearing these reservations in mind and in line with the official norms, SEF

54. General learning area—a teaching station.

55. The Cafetorium.

is obliged to propose, for the school used as reference, an open area of 209 m2 (2,275 square feet) accommodating 65 pupils and two teachers, including storage space. According to SEF, this area would be ideal if the number of pupils was halved.

5. Unified Arts Common

The work in each of the four areas which together make up the unified arts area is skill-oriented and often noisy. Pupils will therefore need a nearby or adjacent enclosed space where they can quietly plan their individual work, study, read, view, design and discuss in small pupil groups or with teachers. Such a space could be provided in each of the four main areas but this would not satisfy the need to supplement and complement the concepts, processes and uses of materials in these four areas. Therefore SEF proposes a common space which should be enclosed with demountable partitions containing some glass portions for supervision. It should be large enough to accommodate about 10 per cent of the pupils gathered at any one time in the unified arts area. Equipped with study carrels, a design and planning area, tables, seating, audio-visual materials and equipment, reference books and periodicals, it would supplement the information and learning services available in the Library resource centre. In addition, integrative and interdisciplinary investigations within the unified arts could occur here.

Enclosed Learning Areas

Another part of the intermediate school curriculum consists of music, typewriting (where included) and physical education. These subjects are best located in enclosed areas. They have however similar learning characteristics, for they all stress performance activities. They could be located in a part of the school removed from quieter places such as the general learning areas and the library resource centre, but it is recommended that the music area be close or adjacent to the cafetorium stage and that the other three areas (music, typewriting and physical education) be located fairly close to the unified arts area.

1. The Music Area

The need is stressed for an expanded music curriculum open to all pupils of an intermediate school — including the practice of music. The corresponding facilities would comprise a music room or rooms, practice rooms, and a teachers' workroom. A general music room serving both instrumental and vocal music activities requires an area of 120 m2 (1,300 square feet) and a room intended only for vocal music requires 92 m2 (1,000 square feet). These area recommendations include the space required for the storage of furniture, instruments and supplies. A suggested size for an acoustically enclosed practice room is about 9 m2 (100 square feet). Workroom space for teachers should be provided on the basis of about 5 m2 (55 square feet) per teacher. For the school used as reference, music area requirements would amount to 254 m2 (2,765 square feet).

2. The Typewriting Area

SEF urges that typewriting be included in the curriculum of all intermediate schools. At this level, typewriting should

not be considered as a vocational subject but emphasis should rest on the personal use of typewriting. Pending a change of curriculum in this direction and the introduction of corresponding building norms, SEF proposes at present that one room of about 110 m2 (1,200 square feet) be provided essentially for pupils of the 9th grade. If it were decided to include typewriting in the curriculum also of grades 7 and 8, consideration should be given to the possibility of providing a typewriting facility which could accommodate large groups of pupils.

3. The Physical Education Area

SEF has based its recommendations on the assumption that the physical education curriculum would be extended beyond physical education as such to include health and safety education, and recreation, and that the facilities would be used by the community in after school hours and for 12 months of the year. SEF does not at this level recommend the « gymnatorium » concept (a combination of gymnasium and auditorium) which presents serious disadvantages for each of the uses to which it is put, but considers the « cafetorium » concept as perfectly valid where cafeteria and auditorium activities are combined and occur in one single facility. As a result, SEF recommends a specific and enclosed area for physical education the size of which will depend directly on enrolment and on the emphasis given to this subject matter in the curriculum. For the intermediate school used as reference, SEF proposes a total area of 613 m2 (6,660 square feet).

Administrative and Ancillary Areas

1. The Administration Centre

It is desirable to locate this area at street level close to the main entrance of the school and near the counselling and health centres. Each of these three centres will require demountable partitions to permit easy and economical future change or expansion. SEF recommends a total area of 113 m2 (1,225 square feet) for the administration centre, including a meeting room of 14 m2 (150 square feet) to be shared with the counselling centre. Storage areas for free textbooks and bulk office supplies should be provided at various locations and on various floor levels throughout the school. The suggested area allowance for such storage would be a total of about 36 m2 (400 square feet).

2. The Counselling Centre

The main function of the guidance staff attached to this Centre is counselling, involving both individual pupils and small groups. The pupils may seek the services of a counsellor voluntarily, be referred by teachers, parents or school administrators, or be scheduled by a counsellor for specific reasons. Consultations with teachers, parents and other persons are frequently held.

SEF suggests that one guidance counsellor should be provided for every 350 pupils in an intermediate school. Based on this ratio and on the functions of its personnel, it is estimated that such a counselling centre would require about 55 m2 (600 square feet). This would include counsellor's offices, reception and storage areas. The staff of the centre would share with the administration the use of the meeting room mentioned under the previous heading.

3. The Health Centre

For all sizes of intermediate schools, a health centre of 41 m2 (450 square feet) is required.

4. The Cafetorium

The cafetorium would have two functions: first, that of an auditorium for school gatherings, dramatical and musical presentations and adult evening meetings, as well as for large group instruction when it cannot be accommodated elsewhere; secondly, that of a dining hall at lunch hours.

SEF is of the view that the auditorium functions should take precedence over lunchroom functions when such facilities are being designed. The overall size of the area will however largely be determined by the number of pupils who will eat lunch there. The size would vary from 230 to 368 m2 (2,500 to 4,000 square feet). In addition, provision would have to be made for a stage of about 74 m2 (800 square feet), a projection area of 14 m2 (150 square feet) at the rear of the cafetorium, and a kitchen/servery complex of about 55 m2 (600 square feet).

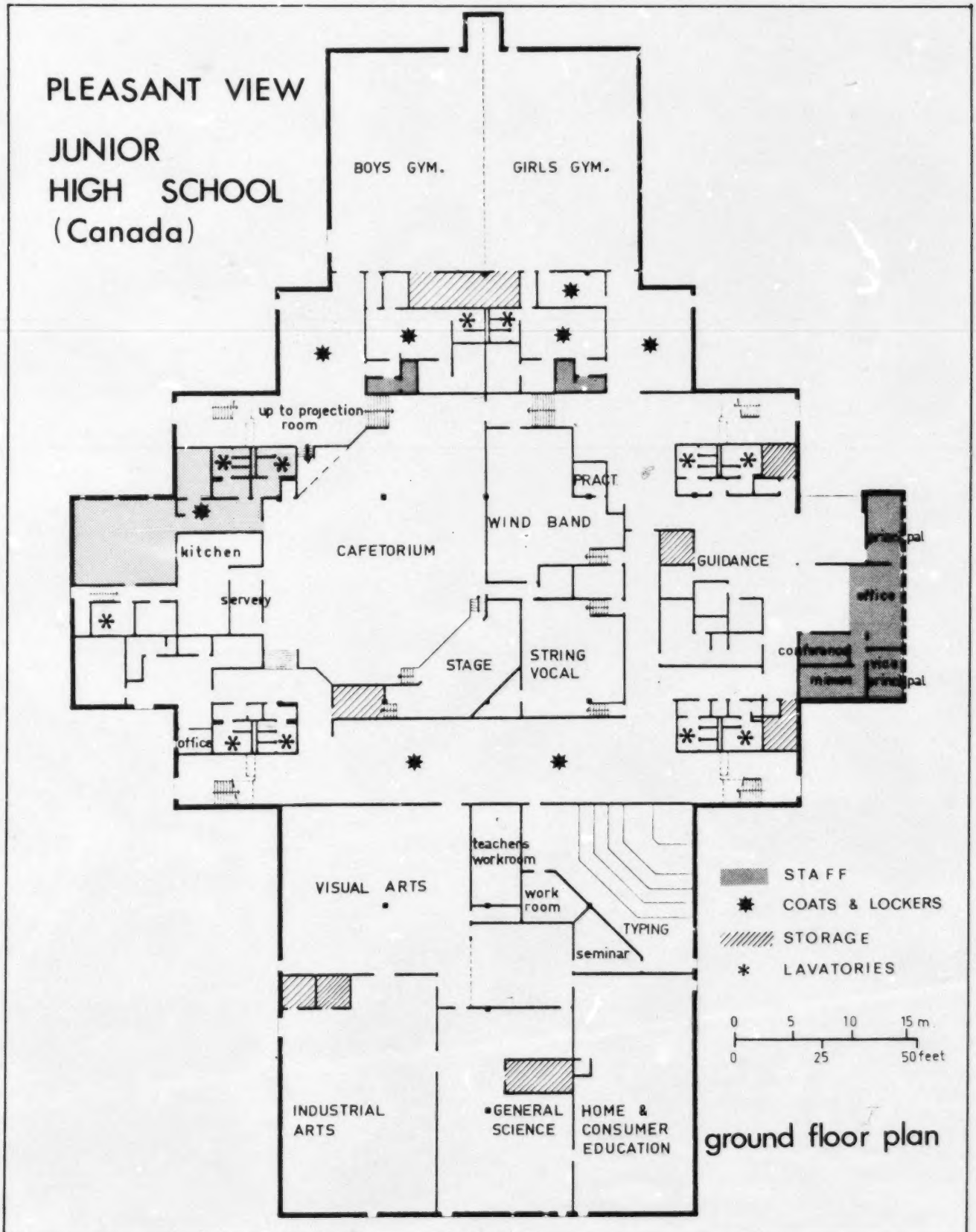
5. Staff Lounge and Dining Area

This area should be adjacent to the cafetorium servery and cover about 74 m2 (800 square feet).

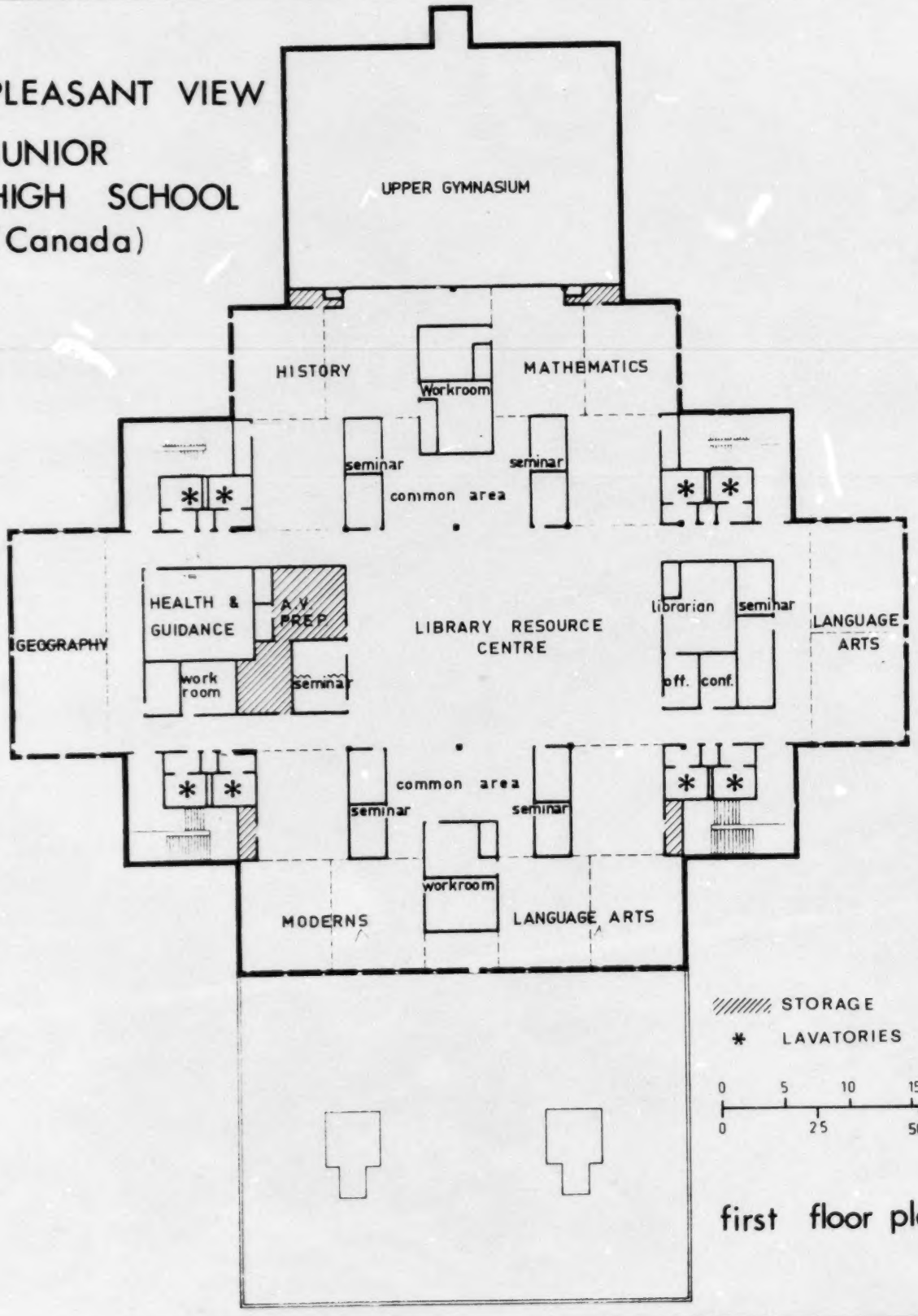
Service Areas

The 1968 Ceiling Cost Formula allocates a gross area of 0.70 m2 (7.75 square feet) per pupil for services. It is the opinion of SEF that this allocation is more than adequate and that it should in fact be possible to effect economies here.

Table 18 allows a comparison to be made between the theoretical programme described above and the programme implemented at Pleasant View Junior High School. Pleasant View has the same enrolment as the school chosen by SEF for defining its recommendations for the intermediate school. While the plans and photos that follow are actually of Pleasant View Junior High School, they also serve to illustrate more vividly the practical application of SEF's theoretical programme.


PLEASANT VIEW
JUNIOR
HIGH SCHOOL
(Canada)
BOYS GYM.
GIRLS GYM.
up to projection room
PRACT
WIND BAND
kitchen
CAFETORIUM
GUIDANCE
servery
office
STAGE
STRING
VOCAL
office
teachers workroom
VISUAL ARTS
work room
TYPING
seminar
STAFF
COATS & LOCKERS
STORAGE
LAVATORIES
0 5 10 15 m
0 25 50 feet
INDUSTRIAL ARTS
GENERAL SCIENCE
HOME & CONSUMER EDUCATION
ground floor plan

PLEASANT VIEW JUNIOR HIGH SCHOOL (Canada)



first floor plan

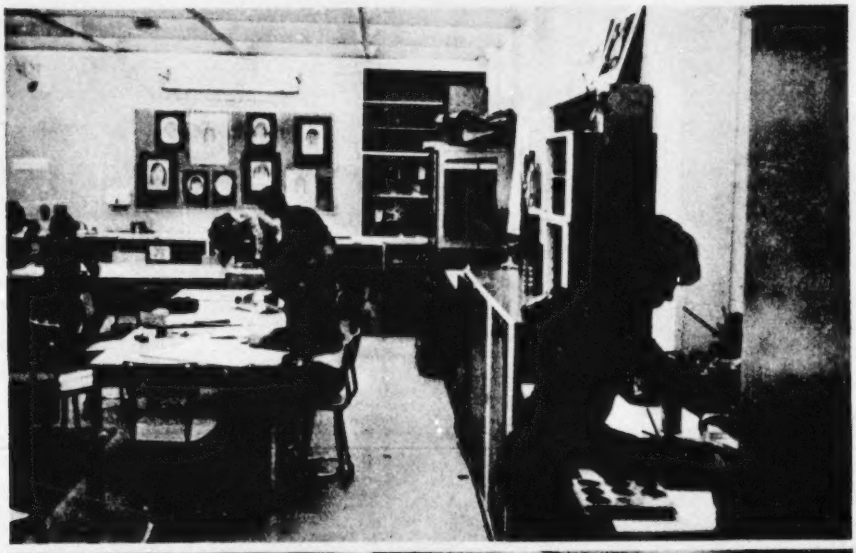
TABLE 18:

Comparison between SEF's theoretical programme for an intermediate school (7th, 8th and 9th years) of 878 pupils and the programme implemented at Pleasant View Junior High School with the same enrolment

TYPE OF FACILITY OR SPACE	SEF'S THEORETICAL PROGRAMME						PROGRAMME IMPLEMENTED AT PLEASANT VIEW SCHOOL					
	square metres			square feet			square metres			square feet		
TEACHING AREAS												
General Learning Areas												
— teaching stations	17 x 69 =	1,173		17 x 750 =	12,750		16 x 69 =	1,104		16 x 750 =	12,000	
— commun spaces		272			2,975			295			3,200	
— seminar rooms		84			900		6 x 14 =	84		6 x 150 =	900	
— teacher workrooms		156	1,685		1,705	18,330	6	147	1,630	6	1,600	17,700
Unified Arts Area												
Industrial arts		295			3,200			290			3,150	
Home economics		230			2,500			225			2,450	
Visual arts		209			2,275			207			2,250	
General science		330			3,550			220			2,400	
Unified arts common												
— teacher workroom	58			630			48			525		
— pupil activity area	62	120	1,184	675	1,305	12,830	55	103	1,045	600	1,125	11,375
Music Areas												
— instrumental room		120			1,300			120			1,300	
— vocal room		92			1,000			92			1,000	
— practice rooms		27			300		3 x 9 =	27		3 x 100 =	300	
— teacher workroom		15	254		165	2,765		14	253		150	2,750
Typewriting Area			110			1,200		(commercial subjects)	208		(commercial subjects)	2,275
Physical Education Area												
— gymnasium (double)		580			6,300		2 x 269 =	538		2 x 2,925 =	5,850	
— teacher workroom		33	613		360	6,660		37	575		400	6,250
Circulation - about 20%			768			8,357	see below		—	see below		—
TOTAL TEACHING AREA			4,610			50,142		(without circulation)	3,711		(without circulation)	40,350
ANCILLARY AND ADMINISTRATION AREAS												
Information Service Area												
— library resource centre	567			6,162				620			6,750	
— audio-visual service area	41		608	450		6,612		67	687		725	7,475
Administration Centre (including meeting room)			113			1,225			129			1,400
Counselling Centre			55			600			50			550
Health Centre			41			450	39 + 69		108	425 + 750		1,175
Cafetorium												
— cafeteria/auditorium		368			4,000			412			4,475	
— stage and projection booth		88			950			92			1,000	
— staff lounge and dining area		74			800			80			875	
— kitchen and servery		55	585		600	6,350		69	653		750	7,100
Physical Education Ancillary Areas												
— equipment storage		37			400			37			400	
— outdoor storage		18			200			18			200	
— changing rooms		74			800					2 x 475	950	
— showers		55	184		800	2,000	2 x 44	88		2 x 150 =	500	2,050
							2 x 14	46	189	2 x 100		
							2 x 9					
School Storage Areas			37			400			41			450
Lavatories												
— for teachers		27			300			46			500	
— for pupils		165	192		1,800	2,100		189	235		2,050	2,550
Circulation - about 20%			360			3,947	Total		1,080	Total		11,750
TOTAL ANCILLARY AND ADMINISTRATION AREAS			2,175			23,684		(without circulation)	2,093		(without circulation)	22,750
SERVICE AREAS	878 x 0.65		565	878 pupils x 7 =		6,146		(of which 373 for lockers)	561		(of which 4,050 for lockers)	6,100
GRAND TOTAL NET			7,350			79,972			7,445			80,950
GRAND TOTAL GROSS			8,178			88,848			8,059			87,510

Comparison between the SEF programme and the norms of the metropolitan Toronto school board

Net area:	Square metres	Square feet
SEF area recommendations	7,350	79,972
Official norms	878 pupils x 8.3 = 7,287	878 pupils x 90 = 79,020
Gross area		
SEF area recommendations	8,178	88,848
Official norms	878 pupils x 9.2 = 8,077	878 pupils x 99.9 = 87,712



56, 57, 58. The visual arts area.

THE LIBRARY RESOURCE CENTRE OF THE INTERMEDIATE SCHOOL

In view of the important role played by documentation and self-learning activities in the multi-option school, it seemed of particular interest to include in this section a description of the facilities prescribed by SEF for the library resource centre at the level of the intermediate school (1). SEF not only clarifies the implications of the concept but also provides the architects with detailed instructions regarding the functions, contents and internal layout of such a centre.

The description will be followed by a concrete example illustrated by the plan of the library resource centre at Arlington Senior Public School. The centre has been fitted out with *ff5* furniture, which is a sub-system of the SEF construction system. The arrangement of the furniture shown on the plan is only indicative since it is often changed by the pupils and teachers. These changes are facilitated by the modular nature of the furniture. Drawings of the furniture units used in the library resource centre follow the plan, and each unit bears its *ff5* catalogue number enabling it to be identified on the plan. The various units are formed from a number of easily recognisable basic modules (2).

Functions

The library resource centre today plays a key role in the educational process and serves as the « hub » of the school. Flexible timetabling, independent study, emphasis on creativity, non-grading, seminar discussions, team-teaching and the growing interest in community use of school facilities are making unprecedented demands upon the school library. They place the librarian in a key position as a member of every teaching team in the school. To meet these new demands, the Centre itself requires much more space than hitherto and must be able to offer a wide variety of material in different media. The main functions of the library resource centre can be summarised as follows:

— **facilitating the pupil's search for information**, i.e.
— help and advise the pupil in searching and locating the information he needs (over-abundance of resources);
— assist and guide the pupil in his reading (need for a wide variety of materials at different levels and on different subjects);
— provide the necessary framework for pupils engaged in projects, class work or independent study;
— ensure wide circulation of materials together with the most extensive library hours possible; in other words a library should « proffer information rather than ration it » (3);
— **facilitating the work of the teachers**. receive them, encourage their using documents and media, help them to work in teams and co-ordinate their teaching;
— **serving the community** within the framework of a process of recurrent education. This accessibility to the public must not however interfere with its primary function as a school's library, which should have priority.

Location, Types of Spaces and Conditions of Use

Because of the nature of its functions, the library resource centre should be strategically located, particularly in relation to the general learning areas. Ground floor location is desirable in that it ensures easy access to the public but so is the location away from noisy activities.

In its report on the elementary school E1, SEF stated that library accommodation of 30 per cent of the school's enrolment was an ideal. According to SEF, this figure of 30 per cent may even turn out to be conservative a few years from now in the light of the growing use of information materials. Since the present ceiling cost formula for the intermediate school does not allow library accommodation of more than 20 per cent of enrolments, it is essential to provide for the possible future expansion of the library resource centre. This means that in a senior public school built to accommodate a total of 845 pupils, the library resource centre should be able to seat 170 as follows:

— table seating	50
— carrels	35
— soft seats	25
— seminar room seating	60
	170

The following space distribution shows in detail SEF's area recommendations for such a centre in the school referred to above.

	m2	*sq. ft.*
— seminar rooms (6) *	83	900
— teacher-librarian conference room	14	150
— AV storage and workroom	18	200
— carrels (34 x 2.30 m2 or 25 square feet) *	78	850
— soft seating (25 x 1.85 m2 or 20 square feet) *	46	500
— tables (50 places x 1.85 m2 or 20 square feet) *	92	1,000
— workroom (s) *	37	400
— librarian's office *	14	150
— shelving for 20,000 books (5 shelves high, double units)	110	150
— periodical area (one year's files, back copies in workroom)	14	1,200
— vertical files (documentation)	14	150
— card catalogue (about 60,000 cards needed for 20,000 books and perhaps 40,000 cards for non-print materials, i.e. a total of 100 drawers)	9	100
— charge area	14	150
— flexible display area	1	15
Total	544	5,915

*) The numbers and sizes of these areas will fluctuate according to enrolment and number of centre staff. All other areas should, in principle, remain constant.

1) Summary of chapter 7 of SEF E2, **op. cit.** pages 73-85.
2) For further details concerning the **ff5** furniture see **Information Leaflet N° 4**, "**ff5** - A Canadian 'Casework' or Furniture and Equipment System for Schools", by Paul Lenssen, Programme on Educational Building, OECD, Paris, March 1974.
3) Ralph D. Ellsworth and Hobert D. Wagener, **The School Library: Facilities for Independent Study in the Secondary School**, Educational Facilities Laboratories Inc., New York, 1973, page 13.

Part of the documentation activities will take place outside the library resource centre. The specialised departments have their secondary centres and borrow materials from the main centre.

As regards provision for expansion, three main types of changes can be envisaged:

— that which permits daily reshaping (sliding or mobile partitions which can be opened or closed by the teaching staff between periods);
— that which entails temporary or medium-term expansion by the gradual encroachment on neighbouring spaces or teaching areas; this type of change would necessitate relocation of demountable partitions and of certain services, a re-arrangement which would take two to three days;
— that which would imply the extension of the library resource centre by enlarging the building itself; this would be a major long-term change and would probably occur only once in 10 to 15 years.

Internal Environment

It is essential that the environment of the library resource centre should be lively and stimulating, appropriate to the age of its users. This effect can be achieved partly by selecting bright inviting colours. The following criteria should be respected:

Visual criteria/lighting. Light may emanate from both natural and artificial sources. Whatever the source, it is important to obtain maximum contrast on the object being viewed and minimum brightness contrast at the source; all reflecting surfaces should be avoided. A high quality of lighting throughout the library resource centre will facilitate rearrangement of furniture and equipment. Windows are used more as a means of providing contact with the natural environment than as a source of natural light. Although glass has been developed which reduces unwanted solar heat and glare, large expanses of window are not recommended.

Thermal criteria. Humidity and temperature should be maintained at levels conducive both to the comfort of the users and the care of the materials.

Acoustic criteria. While the seminar rooms, the teacher-librarian conference room, the audio-visual storage and workroom all need to have good sound insulation, complete silence is un-necessary in the other spaces. However, some steps must be taken to reduce noise level: the entire floor surface should be carpeted, a wise selection should be made of materials, textiles and furniture and equipment such as the photocopier should be located as far away as possible from reading and discussion areas.

Carrels. The wide variety of carrels available on the market raises the problem of choice. Some carrels should be wired for the independent use of various types of audio-visual equipment. All should have electronic capability to prepare for the time when access to instructional programmes is more flexible and when computer storage and retrieval of information are less costly. Carrels may be grouped in one area of the library resource centre or dispersed throughout it.

Seminar rooms. In all these rooms, it should be possible to use various media and acoustics, lighting and ventilation should be controllable. If glazed partitions are used, sound insulation would be somewhat reduced. Special blinds would be required to darken the rooms for use of AV equipment. All furniture should be easy to move. One of the rooms should be equipped with about ten typewriters for use by the students.

AV storage and workroom. This area should be a soundproofed room equipped with a great deal of shelving in view of the quantity and diversity of the AV material to be stored in it. The room should have several electrical outlets and possibly double-glazed windows (for supervision and acoustic purposes) opening onto the main area of the centre.

Teacher-Librarian conference room. This room is similar to seminar rooms but is primarily earmarked for necessary and increasingly important consultations between the teachers and the staff of the centre. It might well be located adjacent to the seminar rooms or the librarian's office. When this room is not being used by teachers and/or librarians, it could be placed at the disposal of the pupils.

The workroom and the librarian's office. These rooms are reserved for the staff of the library resource centre. Their size will depend on the strength of the staff which, according to SEF, should increase. For an enrolment of 845, SEF recommends three full-time librarians, plus two library clerks. The workroom should lie close to the charging desk and to the librarian's office. If possible, it should have an outside entrance for deliveries. Adjustable shelves and cupboards are required, as well as electrical outlets and a sink. There should also be large working surfaces, two desks with typewriters, book trucks and filing cabinets. The librarian's office should adjoin the workroom and a glass partition between the office and the main area would make supervision easier. In addition to the necessary furniture (desk, filing cabinets, etc.), the office should have a telephone and an intercommunication system.

Furniture. Well-designed, functional furniture is essential. Because furniture may be regrouped frequently, items should be lightweight, adaptable, adjustable, and durable. The quality of the furniture is important because of the hard wear to which it will be subjected. The variations in physical size of the adolescent users create problems and for this reason, furniture in three different sizes should be considered. Standards for library furniture and equipment have been developed by the *American Library Association (1).*

Chairs and seats. The long-neglected factor of comfort is today considered all-important. Chairs for use at tables and carrels should be in various heights (40 to 46 cm or 16 to 18 inches), and upholstered seats (lounge chairs, sofas and hassocks) provided.

Tables. Many different shapes and sizes of tables are suitable for use in a library. Because they will serve a variety of functions, it is difficult to recommend one shape rather than another. However, rectangular tables provide a larger working surface. SEF recommends the following dimensions: 120 x 180 cm (4' x 6') and 120 x 240 cm (4' x 8') with the level of the table top 25 cm (10 inches) above the seat. In general, wood finishes give a warmer appearance than do many laminated finishes.

Filing cabinets. These must be particularly durable, and since they will be visible in the main areas their physical appearance is of importance. In particular, the drawers must slide easily open and be designed to provide the maximum drawer space possible. Handles should have no sharp edges.

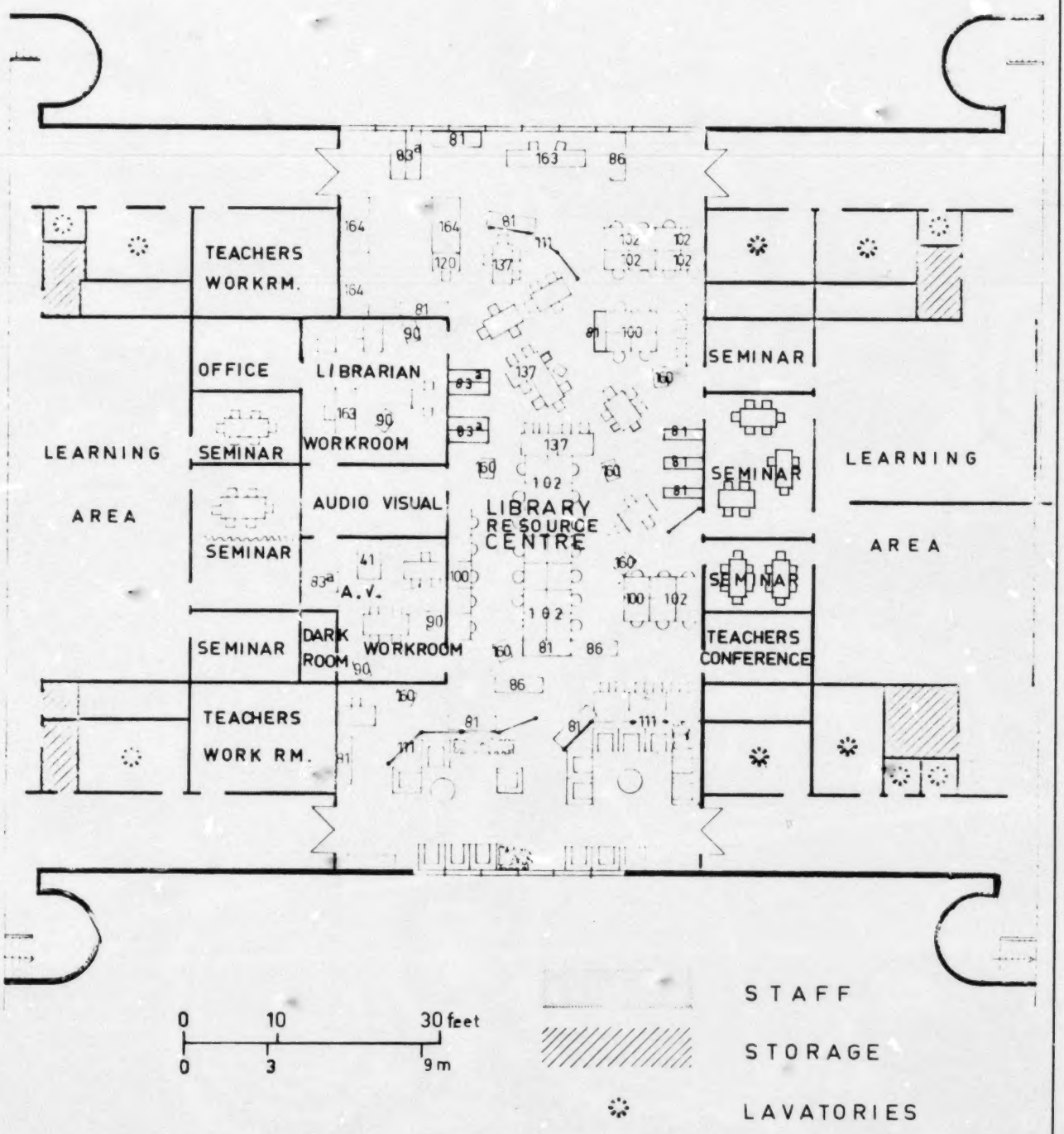
Book trucks. These are used for storage, display and transportation of all kinds of materials, not only in the library resource centre, but also throughout the school.

Charging desks. The method of circulation control will affect the design of the charging desk. A charging desk is not merely a counter, but provides all the filing devices for checking material in and out. In the future these checking operations will probably be handled using a computer — a method still too expensive for school libraries today. Charging desks should not be so high that they create a barrier between the library staff and the users.

Shelving. Wood shelving is popular for its warm appearance. However, what matters is not its constituent material but the function it fulfils. Shelves should not bend, lean, sway or collapse. The standard of a loading rate of 200 kg/m2

1) Library Technology Reports: A Service to Provide Information on Library Systems, Equipment and Supplies to the Library Profession, American Library Association, Chicago, 1965.

LIBRARY RESOURCE CENTRE
ARLINGTON SENIOR PUBLIC SCHOOL (Canada)

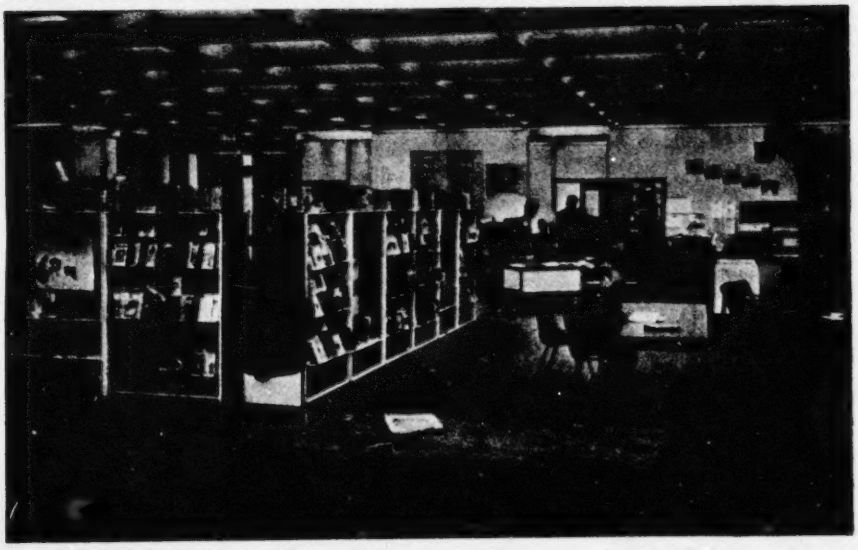


(40 lbs/ft 2) will not be adequate for heavy bound periodicals or for 33 rpm records. The recommended standard for loading is therefore 300 kg/m2 (60 lbs/ft 2) with an appropriate safety factor. Because completely level floors are almost impossible to attain, all library shelves should incorporate levelling devices. In addition, several different types of shelf are indispensible (some for magazines and periodicals, some for reference books, etc.).

Display and exhibit cases. Many ways are necessary for displaying books, manuscripts and other objects both vertically and horizontally. Adequate ventilation and lighting inside the cases are important for the preservation and presentation of the materials displayed in them. When the staff of the library resource centre includes AV technicians, there are likely to be more and better displays.

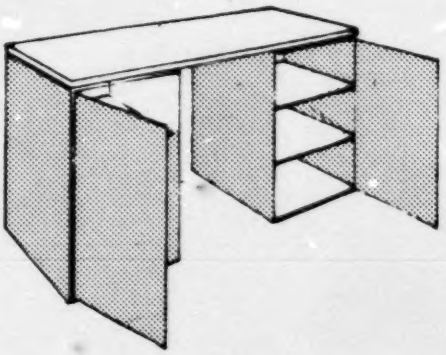
Furthermore, the library equipment will comprise:

— map cases (horizontal storage);
— typewriters (with special keyboards);
— microfilm readers (some with large viewing screens);
— photocopiers.

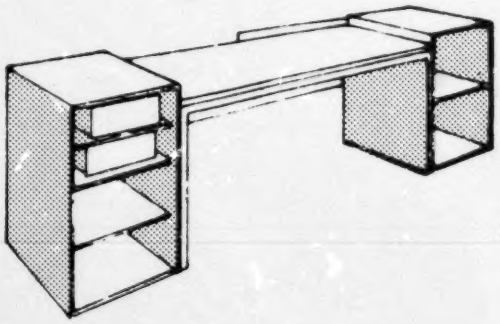


59, 60, 61. The library resource centre.

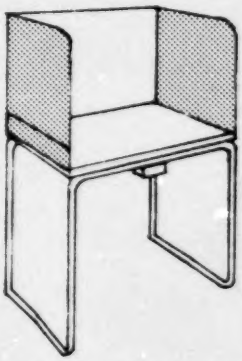
ITEMS OF FURNITURE
FROM THE CAMERON Mc INDOO ff5 CASEWOR



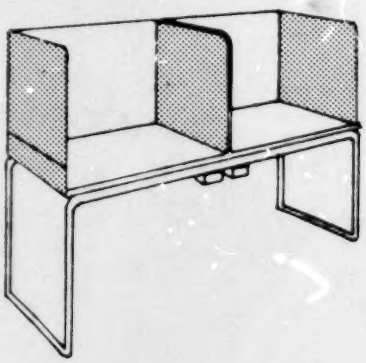
47_ STORAGE COUNTER



168 _ CHARGING DESK

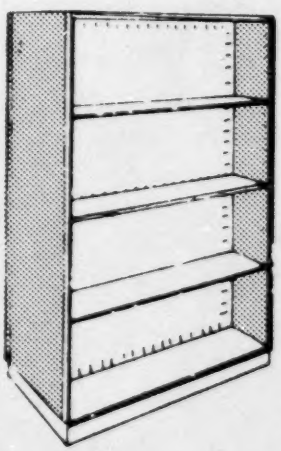


100 _ SINGLE CARREL

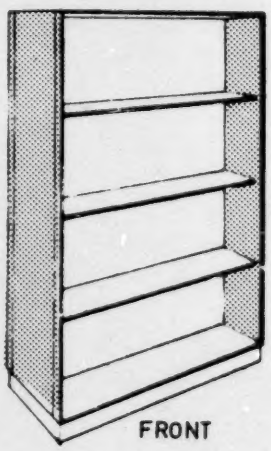


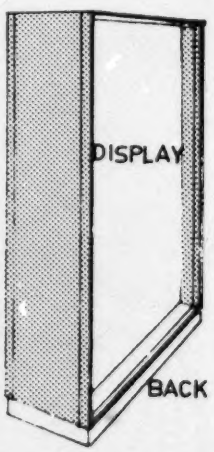
102 _ DOUBLE CARREL

160 _ BOOK TRUCK



81 _ DOUBLE SIDED BOOK SHELVING

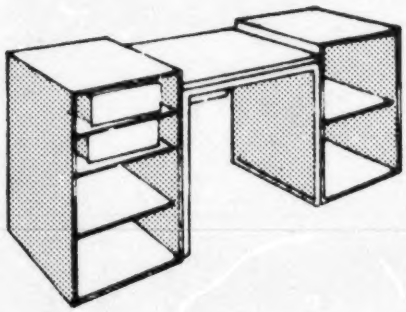




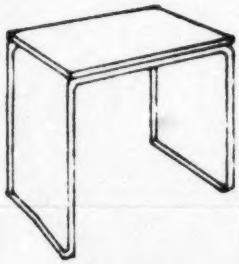
86 _ SINGLE SIDED BOOK SHELVING

NOTE : Numbers refer to the plan of the Library Resource Centre

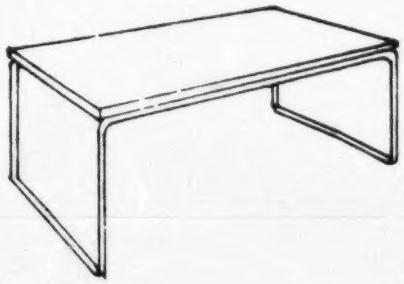
SYSTEM USED IN THE LIBRARY RESOURCE CENTRE



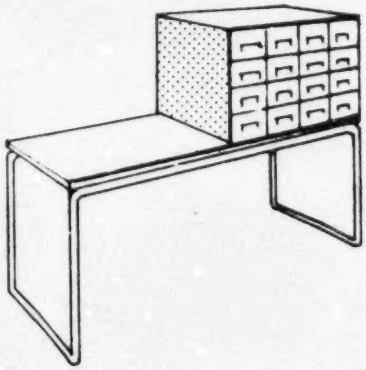
162 _ CHARGING DESK



120_ ADJUSTABLE HEIGHT TABLE

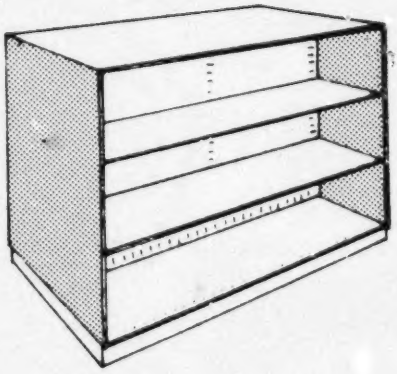


137 _ FIXED HEIGHT TABLE

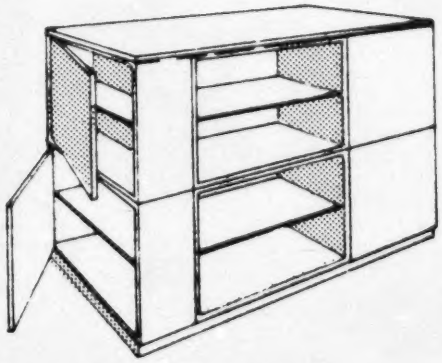


164 _ CARD CATALOGUE UNIT

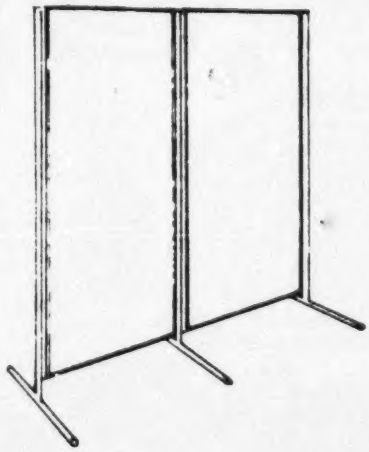
90 _ STORAGE CART



83 a _ DOUBLE SIDED BOOK SHELVING



41 _ GENERAL STORAGE



111_ VERTICAL PANEL DIVIDERS

Acknowledgments

The **photographs** in this publication have been provided by the members of the team, with the exception of numbers 50, 51, 52 and 53 which have been made available to the author by the Board of Education for the Town of Malmö, Sweden;

Sources for the following **figures** are as follows:

Figure 1: Model of the SAMSKAP school in diagram form
« Prospects », vol. II, n° 1, Spring 1972, UNESCO, Paris.

Figure 2: Two different schools based on the same educational model.

Figure 7: Use of the *Grossraum*.

Figure 8: Functional diagram.

Mr. Karl-Hermann Koch, member of the team.

Figure 5: Functional diagram.

Figure 6: Diagrammatic presentation of a long work sequence
« *Integrierte Gesamtschule in Fröndenberg* » Kr. Unna, Teil 1.

Plan references:

Project: Maiden Erlegh Secondary School, Earley, United Kingdom.
Architects: The Development Group, the Architects and Building Branch, Department of Education and Science, London.
Plan: from *Building Bulletin 48*, HMSO, London.

Project: Henry Fanshawe School, Dronfield, Derbyshire, United Kingdom.
Architects: The Development Group, the Architects and Building Branch, Department of Education and Science, London.
Plan: from *Design Note 2*, HMSO, London.

Project: Integrierte Gesamtschule in Fröndenberg, Fröndenberg, Germany.
Architects: Dipl. Ing. Jan Bassenge MA,
Dipl. Ing. Kay Pyhan-Schulz,
Dipl. Ing. Hasso F. Schreck,
Architektengemeinschaft, Berlin.
Plan: from the booklet « *Integrierte Gesamtschule in Fröndenberg* ».

Project: Gröndalsskolan, Värnamo, Sweden;
Architects: Olle Wahlström,
Uddén and Wahlström Arkitektkontor AB.
Plan: from the booklet « *Sju Skolor* ».

Project: Kroksbäckskolan, Malmö, Sweden.
Architects: Messrs Dahl and Strömdahl, Ark. SAR.
Plan: The Board of Education for the Town of Malmö.

Project: Pleasant View, Willowdale, Ontario, Canada.
Architects: Boigon and Heinonen.
Plan: The Board of Education for the Borough of North York.

Project: Arlington Senior School, York, Canada.
Architects: Brook, Carruthers, Grierson, Shaw, Toronto, Ontario.
Plan: The Board of Education for the Borough of York.
Items of furniture *ff5*: Cameron McIndoo, Don Mills, Ontario, Canada.

OECD SALES AGENTS
DEPOSITAIRES DES PUBLICATIONS DE L'OCDE

ARGENTINA – ARGENTINE
Carlos Hirsch S.R.L.,
Florida 165, BUENOS-AIRES
☎ 33-1787-2391 Y 30-7122

AUSTRALIA – AUSTRALIE
B.C.N. Agencies Pty. Ltd.,
161 Sturt St., South MELBOURNE, Vic. 3205
☎ 69 7601
658 Pittwater Road, BROOKVALE NSW 2100
☎ 938 2267

AUSTRIA – AUTRICHE
Gerold and Co., Graben 31, WIEN 1
☎ 52 22 35

BELGIUM – BELGIQUE
Librairie des Sciences
Coudenberg 76-78, B 1000 BRUXELLES 1
☎ 13.37.36/12.05.60

BRAZIL – BRESIL
Mestre Jou S.A., Rua Guaipa 518,
Caixa Postal 24090, 05089 SAO PAULO 10
☎ 256-2746/262-1609
Rua Senador Dantas 19 s/205-6, RIO DE JANEIRO GB ☎ 232-07 32

CANADA
Information Canada
171 Slater, OTTAWA K1A 0S9
☎ (613) 992-9738

DENMARK – DANEMARK
Munksgaards Boghandel
Nørregade 6, 1165 KØBENHAVN K
☎ (01) 12 69 70

FINLAND – FINLANDE
Akateeminen Kirjakauppa
Keskuskatu 1, 00100 HELSINKI 10 ☎ 625 901

FRANCE
Bureau des Publications de l'OCDE
2 rue André Pascal, 75775 PARIS CEDEX 16
☎ 524 81 67
Principaux correspondants:
13602 AIX-EN-PROVENCE Librairie de l'Université ☎ 26 18 08
38000 GRENOBLE B. Arthaud ☎ 87 25 11
31000 TOULOUSE Privat ☎ 21 09 26

GERMANY – ALLEMAGNE
Verlag Weltarchiv G.m.b.H.
D 2000 HAMBURG 36, Neuer Jungfernstieg 21
☎ 040-35-62-501

GREECE – GRECE
Librairie Kauffmann, 28 rue du Stade,
ATHENES 132 ☎ 322 21.60

ICELAND – ISLANDE
Snaebjorn Jonsson and Co., h.f.,
Hafnarstraeti 4 and 9, P.O.B. 1131,
REYKJAVIK ☎ 13133/14281/11936

INDIA – INDE
Oxford Book and Stationery Co.
NEW DELHI, Scindia House ☎ 47388
CALCUTTA, 17 Park Street ☎ 24083

IRELAND – IRLANDE
Eason and Son, 40 Lower O'Connell Street,
P.O.B. 42, DUBLIN 1 ☎ 01-41161

ISRAEL
Emanuel Brown
35 Allenby Road, TEL AVIV ☎ 51049/54082
also at:
9, Shlomzion Hamalka Street, JERUSALEM
☎ 234807
48 Nahlath Benjamin Street, TEL AVIV
☎ 53276

ITALY – ITALIE
Libreria Commissionaria Sansoni,
Via Lamarmora 45, 50121 FIRENZE ☎ 579751
Via Bartolini 29, 20155 MILANO ☎ 365083
Sous-dépositaires:
Editrice e Libreria Herder,
Piazza Montecitorio 120, 00186 ROMA
☎ 674628
Libreria Hoepli, Via Hoepli 5, 20121 MILANO
☎ 865446
Libreria Lattes, Via Garibaldi 3, 10122 TORINO
☎ 519274
La diffusione delle edizioni OCDE è inoltre assicurata dalle migliori librerie nelle città più importanti.

JAPAN – JAPON
OECD Publications Centre,
Akasaka Park Building,
2-3-4 Akasaka,
Minato-ku
TOKYO 107 ☎ 586-2016
Maruzen Company Ltd.,
6 Tori-Nichome Nihonbashi, TOKYO 103,
P.O.B. 5050, Tokyo International 100-31
☎ 272-7211

LEBANON – LIBAN
Documenta Scientifica/Redico
Edison Building, Bliss Street,
P.O.Box 5641, BEIRUT ☎ 354429 – 344425

THE NETHERLANDS – PAYS-BAS
W.P. Van Stockum
Buitenhof 36, DEN HAAG ☎ 070-65 68 08

NEW ZEALAND – NOUVELLE-ZELANDE
The Publications Officer
Government Printing Office
Mulgrave Street (Private Bag)
WELLINGTON. ☎ 46 807
and Government Bookshops at
AUCKLAND (P.O.B. 5344) ☎ 32 919
CHRISTCHURCH (P.O.B. 1721) ☎ 50 331
HAMILTON (P.O.B. 857) ☎ 80 103
DUNEDIN (P.O.B. 1104). ☎ 78 294

NORWAY – NORVEGE
Johan Grundt Tanums Bokhandel,
Karl Johansgate 41/43, OSLO 1 ☎ 02-332980

PAKISTAN
Mirza Book Agency, 65 Shahrah Quaid-E-Azam,
LAHORE 3 ☎ 66839

PHILIPPINES
R.M. Garcia Publishing House,
903 Quezon Blvd. Ext., QUEZON CITY,
P.O. Box 1860 – MANILA ☎ 99.98.47

PORTUGAL
Livraria Portugal,
Rua do Carmo 70-74 LISBOA 2 ☎ 360582/3

SPAIN – ESPAGNE
Libreria Mundi Prensa
Castello 37, MADRID-1 ☎ 275.46.55
Libreria Bastinos
Pelayo, 52, BARCELONA 1 ☎ 222 06 00

SWEDEN – SUEDE
Fritzes Kungl. Hovbokhandel,
Fredsgatan 2, 11152 STOCKHOLM 16
☎ 08/23 89 00

SWITZERLAND – SUISSE
Librairie Payot, 6 rue Grenus, 1211 GENEVE 11
☎ 022-31 89 50

TAIWAN
Books and Scientific Supplies Services, Ltd.
P.O.B. 83, TAIPEI

TURKEY – TURQUIE
Librairie Hachette,
469 Istiklal Caddesi,
Beyoglu, ISTANBUL, ☎ 44.94.70
et 14 E. Ziya Gokalp Caddesi
ANKARA ☎ 12 10 80

UNITED KINGDOM – ROYAUME-UNI
H.M. Stationery Office, P.O.B. 569, LONDON
SE1 9NH, ☎ 01-928-6977, Ext. 410
or
49 High Holborn
LONDON WC1V 6HB (personal callers)
Branches at: EDINBURGH, BIRMINGHAM,
BRISTOL, MANCHESTER, CARDIFF,
BELFAST.

UNITED STATES OF AMERICA
OECD Publications Center, Suite 1207,
1750 Pennsylvania Ave, N.W.
WASHINGTON, D.C. 20006 ☎ (202)298-8755

VENEZUELA
Libreria del Este, Avda. F. Miranda 52,
Edificio Galipán, Apdo. 60 337, CARACAS 106.
☎ 32.23.01/33.26.04/33.24.73

YUGOSLAVIA – YOUGOSLAVIE
Jugoslovenska Knjiga, Terazije 27, P.O.B. 36,
BEOGRAD ☎ 621-997

Les commandes provenant de pays où l'OCDE n'a pas encore désigné de dépositaire peuvent être adressées à :
OCDE, Bureau des Publications, 2 rue André-Pascal, 75775 Paris CEDEX 16
Orders and inquiries from countries where sales agents have not yet been appointed may be sent to:
OECD, Publications Office, 2 rue André-Pascal, 75775 Paris CEDEX 16

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 Paris Cedex 16 - No. 34.247 1975
PRINTED IN FRANCE